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ABSTRACT

This book was prepared for elementary and secondary school teachers and administrators to help them in implementing nongradedness. It provides specific models, guidelines, suggestions, and references which could be of practical assistance. The first chapter deals with the problems which teachers face in preparing to implement continuous progress and describes a strategy for preparation. This is followed by five chapters prepared by elementary teachers and administrators outlining the details of how they went about implementation, with three chapters describing the process of transforming an elementary school from a graded to a nongraded basis, one describing the personal experiences of a teacher, and one giving details of a pilot project on nongrading the language arts program. The chapters relating to secondary education describe strategies or attempts to develop curricula in the basic disciplines. The objectives, basic skills, and suggested teaching techniques and learning activities for a sequential English program are presented. Course outlines for a nongraded mathematics program and a broad overview of a nongraded science program are included. In social studies a strategy is developed for transforming the curriculum outline for the province of Nova Scotia. The book also includes an extensive bibliography on nongrading, team teaching, and individualized instruction. (MBM)

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IMPLEMENTING NONGRADEDNESS: ADMINISTRATIVE PLANS AND CURRICULUM DESIGNS

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FOREWORD

This book was especially prepared for elementary and secondary school teachers and administrators who are grappling with the question of how to go about implementing nongradedness. It provides specific models, guidelines, suggestions, and references which could prove to be of much practical assistance. It brings one face to face with the hard realities involved in implementation.

The book opens with a chapter prepared by the editors on the problems teachers face in preparing to implement continuous progress and describes a strategy for preparation. This is followed by five chapters prepared by elementary teachers and administrators outlining specifically the details of how they went about implementation. Three of these chapters describe the processes involved in transforming a particular elementary school from a graded to a nongraded basis. The fourth chapter describes the personal experiences of an elementary school teacher in establishing a nongraded reading program in a self-contained classroom. The fifth chapter gives the details of a specific pilot project on nongrading the language arts program.

All the chapters pertaining to secondary education describe strategies or attempts to develop curricula in the basic disciplines suited to the needs of a nongraded school. The objectives, basic understandings and skills, and suggested teaching techniques and learning activities for a sequential secondary English program are presented in detail along with a plan for organizing and implementing this curriculum in a specific school. Course outlines for a nongraded mathematics program have been developed in which objectives, concepts and operations, and suggested teaching techniques or approaches are specified. In the area of science a broad overview of a nongraded science program is presented. In the social studies a strategy for transforming the curriculum outline for the province of Nova Scotia into a plan suited to the needs of a nongraded secondary school is developed. The book ends with a very comprehensive and up-to-date bibliography on nongrading, team teaching, and individualized instruction. The preparation of this bibliography involved an elaborate extension and updating of the one published in **A Teacher's Guide to Nongrading,** 1969.

The materials presented in this book represent primarily projects developed by teachers and administrators enrolled in the weekend course on Implementing Nongrading offered by St. Francis Xavier University in 1969-1970 academic year. To the following teachers and administrators who worked so diligently to prepare these materials is owed a special debt of gratitude:

Elementary: Sister Beaton, James Burton, Donald Campbell, Anne Marie Conn, Kathleen MacNeil, Marie Stefano, and Jane Sharp.

Secondary: English A—Marie Walsh, Mary Walsh, English B—Margaret Bonvie, Marie Walsh, Mary Walsh; Mathematics—John Broderick, Antonia Corsten, Irene MacKay, Agnes MacLellan; Science — Mary Chisholm; Bibliography — Paulette Poirier.

Words of appreciation are also in order for the capable aid provided by our student assistant, Margaret Carpeneto.

Chapter I

AN APPROACH TO PREPARING FOR THE IMPLEMENTATION OF NONGRADEDNESS

What The System Has Done to Teachers

Too many teachers react to change with doubt, hesitation, fear, and sometimes outright hostility. The claim has been made that the greatest opposition to nongradedness comes not from the general public, or parents, or school boards, or pupils, but from teachers. One explanation that has been given is that teachers are "down on" nongrading because they are not "up on" it. It is our contention that if a significant number of teachers react adversely to such an innovation, the educational system must bear a great deal of responsibility for making them that way. How many idealistic, energetic, and creative young teachers have been squelched into passivity by the bureaucratic demands of the educational system? Laying the blame at the door of our educational system calls for an explanation. An examination of the reasons for this is in order.

One of the worst sins committed by the system is the large teaching load it imposes upon teachers. It is customary in this province for teachers to have not more than one period per day during which they are free of actual teaching duties. In a significant number of schools teachers have no free periods at all. Outside of the time they spend teaching, they have to prepare lessons; construct and correct assignments, tests and examinations; confer with pupils; consult with parents; and attend meetings. In addition to these basic professional duties, a whole barrage of non-professional activties impinge upon them. They must do yard, washroom, corridor, lunchroom, gymnasium, and study hall supervision. They must coach sports teams or direct or supervise extra-curricular activities. They must complete a vast number of forms such as attendance reports, health reports, report cards, and cumulative records. It does not take much reflection to lead one to wonder if it is really economical to have professional people doing all these non-professional tasks. Would this be required of a doctor or a lawyer? Would business or industry stand for this wasteful kind of utilization of its professional staff?

The school system is paying a very high price for the excessive demands it makes on teachers. What is sacrificed is excellence. Where is a teacher to find the time to read, to reflect, to assess, and to dream—the processes that bring true innovation? Teachers get so bound up in the demands of the system that often they have to get outside of it before they can see what has happened.

The financial limitations imposed on our educational system demand that teachers get along without many things that are musts for offering a flexible program to accommodate the needs of youth. Educators are amazed to find that many teachers do not feel comfortable about using a variety of instructional materials. How could they expect them to react otherwise when for years these teachers were conditioned to have no materials other than prescribed textbooks. The amount of money currently available for resource materials is still most inadequate. This is the first year in which the Department of Education in our province has allocated money for the purchase of school library books, and the strings attached to this allocation make it impossible for a considerable number of schools to get it. If you want to know the real reason why pupils cannot read, it is because our schools have been unable to expose them to a variety of quality books.

People who wonder why teachers do not organize their classes flexibly for instruction should take another look at the physical plants in which they operate. Almost without exception classrooms are the same size, and the library space permitted under the Foundation Program is totally inadequate. Schools are not built to accommodate a particular program; the program has to be accommodated to the building. In addition, overcrowding is a chronic condition. How can one expect teachers to encourage large group instruction, small group discussion and laboratory work, and independent study when most of our schools have neither the physical facilities nor the minimum of resource materials needed to carry on these activities?

Some of the blame for mediocrity must also be leveled at autocratic and outmoded administrative procedures. Democracy appears to be more honored in the breach than in the observance in education. How many administrators permit teachers to share in the task of developing school policy? How many administrators consult teachers regarding how the teaching load should be assigned or how the class should be organized and scheduled for instruction in their department? How often is the advice of teachers sought regarding the purchasing of equipment, facilities, and books which they will use? How much freedom do teachers have to devise an evaluation procedure suited to the needs of their particular group of pupils and the subjects which they teach? We are not posing these questions and issues to excuse the weaknesses of our educational system. We are not posing them to exonerate teachers totally from blame for our educational ills. We are posing them so that people who read this book will reflect on what has happened to our school system and work to do something about it. We need a commitment at all levels, from the Provincial Department of Education to local school boards and administration, to the development of a school system which will encourage, support, and reward the kinds of initiative, creativity, and innovation on the part of teachers needed to offer top-quality education to all youth.

In spite of the obstacles imposed by the system, the teaching profession has been blessed with a fair share of creative people who have searched continuously for better ways to educate our children. It is these people who, for the most part, are attracted to the idea of nongradeness. To them it offers some of the answers for which they have been searching. Fortunately for us, it was this type of person who appeared to be attracted to the weekend course on Implementing Nongradedness which was offered by St. Francis Xavier University during the past academic year. An observation of the effects that the activities required by this course appeared to encourage leads us to believe that from it we gained some insights that might be helpful in improving the in-service activities associated with the implementation of nongradedness. In the pages that follow the nature of this course will be described, the reactions of the people who took it, and the insights gained into in-service education.

THE WEEK-END COURSE ON IMPLEMENTING NONGRADING

The week-end course on Implementing Nongrading was designed specifically to meet the needs of interested practitioners. This course was divided into two sections: one for administrators and elementary school teachers; another for secondary school teachers. Two professors offered the course. One had a background in administration and elementary education. The other had a background in secondary education. A review of the following copy of the course outline will acquaint you more specifically with the nature of this course.

Course Outline

WEEKEND COURSE ON NONGRADING

Education Department, St. Francis Xavier University

Objectives

To develop an understanding in depth of the various aspects of nongradedness required to engage in the process of implementation.

To delineate those aspects of current nongraded plans that may be adapted to local conditions.

To develop a detailed plan for implementing nongrading in a particular local situation either at the administrative level or at the level of curriculum and instruction in a particular discipline.

Course Description

This course on nongrading will be offered on a consultative basis and will be individualized to accommodate the particular needs and interests of those participating. Books and materials will be recommended for purchase and will also be made available from a library on nongrading which will be developed specifically for those taking the course. This course will consist chiefly of individualized reading and study and the development of a plan for implementing nongradedness suitable to the peculiar situation of each person taking the course. From time to time the candidates will be required to consult with the co-ordinators of the course to evaluate their progress and to obtain help where needed. Evaluation will be based on the quality of the work submitted and on the candidate's ability to assess and defend what he is doing. All work submitted should reflect knowledge of sound procedures in administrative and curriculum planning. To be more specific, the course may be divided into a number of phases:

PHASE I

In order to obtain needed background information on the theory and practice of nongrading, all candidates for the course will be required to attend all the sessions at the Saint Francis Xavier Institute on Nongrading.

PHASE II

On the first Saturday of week-end classes, all candidates for the course should assemble to present co-ordinators of the course a submission or proposal for implementation on which they intend to work. Each candidate's proposal should be relevant to his own situation, not a hypothetical one, and should reflect adequate background reading and insight into the basic concepts developed during the institute.

PHASE III

At this stage a candidate should prepare or outline a step-by-step procedure for implementation. A detailed plan for implementation should be accompanied by a bibliography of background information. Consultation with the co-ordinators will be necessary in order to refine this procedure and to assess the soundness of the proposed course of action. The time for this assessment will be determined through consultation with the candidates taking the course.

PHASE IV

A series of progress reports will be required from January to March to enable each candidate to refine his detailed plan for implementation.

PHASE V

The course will end with a final report which will involve the submission of the completed plan and a defense of the procedure which will be used for implementation in the following year.

Attendance at the St. Francis Xavier Institute on the Nongraded School, which featured seven of America's finest experts on nongrading, gave all the participants in this course a comprehensive background on the theory and philosophy of continuous progress along with many ideas on implementation. Prior to Christmas, two general sessions were held to enable the teachers to exchange ideas and pose questions. At one of these sessions a local administrator gave a talk on "New Developments in Education in Canada", basing his views on the insights he gained from a cross-Canada tour of innovative schools. As a capstone for this course, Dr. Joshua Segal and Mr. Arnold Taub, Principal and Vice Principal of John Dewey High School, Brooklyn, New York were the featured guest speakers at a weekend workshop on nongrading held in April. These gentlemen described in detail the processes and problems involved in implementing nongradedness in their high school.

At first the idea of a course which did not make primary use of the lecture method proved to be strange and uncomfortable for some people. Most participants were used to being told what to do whereas in this case they had to decide the issue to be studied, and the course of action required to see it through to its logical conclusion. A few weeks of background reading seemed to allay many of their fears. With this behind them, they began to grapple with defining their proposals and the procedures for their development. Some decided to work together on common projects; others decided to work alone. In developing their projects, they found their progress to be uneven. Some weeks they found that they forged ahead. At other times they groped and struggled and suffered more setbacks than gains. Such is the path of independent study.

One of the things on which the participants generally agreed was that as a result of the kind of work they were doing on their projects, they were more prone to question and evaluate what they were doing in school and to search for better ways of reaching their goals. Some of the people who worked together in groups claimed that the greatest value of the course came from the opportunity it gave them to share informally ideas with their associates. In other words, they learned a great deal from one another. When one teacher was passing in her paper, she remarked, "This was quite a learning experience". And that was exactly what the course was designed to be.

AN APPROACH TO PREPARING FOR IMPLEMENTATION

Our experiences in working with practitioners in this course and in doing in-service training have given us some very definite notions on how a staff should proceed in preparation for the implementation of continuous progress. When a staff embarks on this project, background information is a must. It is necessary for them to read up on the philosophy and theory of continuous progress, to review write-ups of existing plans, to hear and question competent guest lecturers, and to visit existing nongraded schools, where this is possible. Preparation, however, can suffer from "overkill". You can beat this idea to death. There quickly comes a point where the reading and listening must be combined with planning and action. It is particularly to the question of the kinds of staff activities that could prove to be most helpful in implementing nongrading that we address ourselves at this point.

In every good school a sound philosophy of education is operational. If teachers are to develop improved ways of educating youth, they must become sensitive to the adequacies and inadequacies of what they are doing. They must train themselves to question why they do things. A teacher cannot tell if he is doing a good job unless he has some idea of what he should be doing. Thus it might be a very beneficial staff project to have each member write up his own philosophy of education, to compare it with the philosophy of education of other staff members, and to assess whether or not it is an operational guide to action. This might provide a very effective approach to developing a philosophy of education in those schools in which one does not already exist.

Once staff members develop a conception of where they are going, then they are in a better position to determine how well they are getting there. One way to do this is to conduct an assessment of how adequately a school is meeting the needs of its pupils. The staff can divide itself into a number of committees to compile and summarize existing data. A staff can be brought to a startling awareness of the inadequacies of its current program through an assessment of data pertaining to such items as the relationship between achievement test scores and grade level, the correlation between ability and achievement, the failure rate, the dropout rate, and the age-grade ratio. The assessment resulting from an analysis of the latter information combined with the insights gained from a well-thought out philosophy of education will provide direction for the course remedial action is to take.

When it comes to the preparation of actual plans for implementation, one of the basic issues that has to be studied and experimented with is effective grouping procedures and classroom organization for instruction. Since there is no general agreement on the superiority of one grouping procedure over another, we would recommend that staff committees review the relative merit of different kinds of grouping and then try to come to a consensus on the forms that would be most appropriate for meeting the needs of the pupils in their school. When the composition and size of various groups has been determined, the issue of classroom organization for instruction is relatively easy to decide. A committee of teachers could map out a plan indicating what is needed in the way of large group instruction, small group work, and independent study. Then, on the basis of this plan, they should assess the adequacy of the physical plant and recommend needed changes. Recommendations could also be made to the administration regarding scheduling procedure that would be required to implement a suitable system of grouping. Flexibility can be achieved through various schemes of phasing, leveling, cycling, and block-scheduling. The administrators will be in the best position to determine which one of these schemes is realistic in the light of staff-student ratio and available facilities.

The next logical step is to bring the curriculum in line with the needs of the pupils. Since many teachers appear to be lacking in some of the operations involved in curriculum development, we would recommend that the staff be divided into subject area groups to study and practice those operations in which they appear to be weak. One of the common areas of weakness is in stating unit and lesson plan objectives in precise behavioral terms which provide a meaningful guide to action. The subject committee could proceed by obtaining samples of properly stated objectives and assess how well their own statements of objectives measure up in terms of these models. They should also discuss how relevant their objectives are as guides to meaningful action.

Until recent years little emphasis was put on skill development in subjects other than English. In addition to the basic learning skills, there are skills peculiar to the mastery of each discipline. This is another area in which subject committees could operate very effectively. Each committee could meet to work on identifying the skills peculiar to their discipline, to make plans for their sequential development throughout the total subject area program, and to identify effective procedures and materials for developing these skills. Until teachers learn to grapple more adequately with skill development, they will tend to hand their pupils on to the teacher of the next level with no more facility for handling the discipline than they had in the previous year. Pupil facility in handling the tools for learning a particular discipline depends directly on the amount of systematic skill development involved in learning that particular discipline.

While skills are tremendously important, they are not an end in themselves, but a means to the end of acquiring and using knowledge. To revamp curriculum, it is necessary for subject teachers to study new approaches to selecting and organizing content. Lists of topics and facts by themselves are meaningless. In order to make content meaningful, it should be identified in terms of concepts, generalizations, or themes that are crucial to an understanding of a particular discipline. These can be stated in the form of problems, issues, questions or assertions that tie units or whole courses together. When a teacher has identified the fundamental elements of content, then he is in a position to select the facts which will provide the raw material for their development. Before delving into this process, teachers may need background information on the structure of their discipline and an opportunity to examine model courses based on this concept. If content coverage is to cease to be a main objective of school courses, teachers must familiarize themselves with new approaches to curriculum development.

The vast array of external examinations that existed until very recently conditioned teachers to be lecturers. A check list can be devised to determine the variety of methods utilized in teaching various disciplines and the frequency of their use. On the basis of this information, subject committees can determine their needs in the area of studying newer methods and approaches to handling their disciplines.

Because of the new freedom which has been given teachers in this province in the area of evaluating and promoting students, staff meetings are necessary to determine the inadequacies of the current system of evaluating and reporting pupil progress and to devise better methods of doing so. A great many changes are needed to transform evaluation from the rigid procedure it was in the past to a continuous process of a flexible nature. It is recommended that teachers study a variety of evaluation procedures and review report cards and reporting procedures developed in innovative schools. This should give them the background needed to devise a defensible procedure suited to the uniqueness of their particular situation.

This approach to implementation involves a considerable amount of work, but there is no way around it. If the total staff is not aware of what education should be doing for the child, of the needs of the children in their school, of procedures involved in curriculum development, grouping, adapting instruction, and in the continuous evaluation of pupil progress, then the school is not ready for nongrading. This kind of work need not be burdensome. Study sessions should be kept as informal as possible. Consultations and lectures should be scheduled only on the basis of need. The whole preparatory phase should not be rushed. Each school should determine how much time it needs for preparation and work out ways of devoting the necessary time to it. Schools that jump on the bandwagon of nongrading without adequate preparation do a disservice to the cause. For fear of being misunderstood, we want to point out that the preparation stage can be combined effectively with a phased program of implementation. Implementation is implicit in the kind of preparation we advocate.

Chapter II

THE DEVELOPMENT
of a
CONTINUOUS PROGRESS PROGRAM
for
ARICHAT ELEMENTARY SCHOOL

Introduction

The educational requirements of this area place increasing demands on schools to offer high quality, customized education for every student. With the rapid expansion of knowledge the goals of education have now changed. These new goals not only demand the teaching of concepts and thinking rather than content and memorization, but also demand a real educational concern for and attention to the individual.

As principal of Arichat Elementary School in the county of Richmond, Sub-system Isle Madame and Louisdale, I wish to report on how we as "modern educators" are trying to meet today's demanding educational requirements. I will first outline the objectives which guide our actions and then explain our efforts to develop a continuous progress program to implement these objectives. This latter point will be viewed from an administrative angle.

The objectives which provided direction for our actions may be outlined as follows:

1. To promote the most effective and efficient utilization of both human and physical resources in educating each student.
2. To make it possible for each individual student to have the diversified and balanced educational experiences necessary to satisfy his needs, interests, and particular style of learning.
3. To develop an understanding of the basic concepts of all disciplines by permitting pupils to progress at their own rate of speed.
4. To reinstate reading as the basis of our entire continuous progress program, realizing very little else can be accomplished without it. This is to be attained by using a multi-text, multi-instruction devices system and by emphasizing the skills under-

lying the texts rather than making a text "the gospel" and end all for everyone.

5. To promote bilingualism in capable and interested students.
6. To individualize instruction so that each student, when ready, will have the opportunity to make his own decisions and be responsible for his own learning.

In our system a comprehensive school had for a long time been a dream. Then in 1967 Mr. M. J. MacNeil, the supervisor of our sub-system, began the ground-work for the existing Isle Madame District High and Arichat Elementary Schools. Included in the exist-facilities are seven industrial shops, three home economics laboratories, a 500 seat audio-visual room, a clerical and commercial department, a music and art center, two gymnasiums, an ample number of academic classrooms, a well-stocked library, and a fine reading clinic.

Teachers' Part

As mentioned previously, I am looking at this project primarily from an administrative point of view. A key administrative concern must be gaining high quality personnel. In this area ten academic teachers, three auxiliary teachers, an art specialist, two music teachers, two physical education teachers, and a reading consultant are all at my disposal to serve the children's needs. The services of a trained guidance counselor are also available.

In order to insure that well-informed teachers are on staff, a ten-week orientation program was set up early in the spring of 1969. On Monday and Wednesday night of each week the teachers of our system met to study the philosophy of continuous progress and to draw up plans for its implementation.

In midsummer I met with the teachers on various occasions to work out pupil placement. On this issue there was much disagreement. On the basis of teacher evalutions, basic skill tests completed in May, materials to be used, and a master sheet of all pupils' progress in French, language arts, and mathematics, a tentative placement was worked out. A profile of the personal and social development of each individual was also included on the initial data sheet and, as a result, we had a fair picture of the students as individuals.

The first few days of the school year found half of our teaching staff working in all disciplines in a large block of time situation. This was our senior elementary section. The other half, the junior elementary staff, worked on a specialization timetable. After the first week of school, during which time an extensive testing program was carried out, many changes were made in the placement of some students. From the outset to Christmas, various committees were set up. These committees were composed of teachers of each grade level, and their job was to outline the skills in mathematics, French, and language arts. Each of these committees did an exceptional job and turned the defined skills over to the principals for the development of a number of programs for individuals and groups of students.

To give an indication of the cooperation among teachers, fourteen teachers' meetings were held between September and Christmas in which time many problems were ironed out and pupil progress calculated. One of these sessions was devoted to an in-service workshop to familiarize teachers with the material resources available and how they could be used to the best advantage.

Timetables were drawn up, and each teacher knew who was coming for instruction at a particular time and at what level this instruction was to be given. This was the role of teachers in the junior elementary section. In senior elementary, the pupils travelled to the class where their level was being taught. But, as December approached, we found that our program in senior elementary was not meeting the needs of the students. Two reasons appeared to account for this:

(a) Even though the incoming students were on a certain level, teachers found that there were wide differences of capability and interest within a level. As a result, a great number of groups arose. This made the teaching job very difficult.

(b) Each teacher had a full slate of disciplines to familiarize himself with, and this proved to be a very difficult task.

To attempt to overcome these problems, specialization was initiated throughout our elementary school. Teachers were then given their choice as to their preferred discipline, and a suitable timetable was drawn up. Teachers found they could devote greater time to preparing a particular subject and thus could make instruction more meaningful. With the new specialized arrangement and heterogeneously grouped classes, work for the teachers was increased as far as organization and presentation was concerned but lessened in regard to implementing various skills in more than one discipline.

From the point of view of the teachers, much more work needs to be done to sophisticate the adaptation of the curriculum, but they undertake this work willingly, knowing that their goal is to give an equal opportunity to each student to learn the basic skills at his own rate.

Students' Part

As principal and part co-ordinator of this plan, it is my hope that students will become more actively involved in the educational process. We want to instill in each pupil a realization of his worth as an individual and make him search out his own identity. He alone can do this. We are but catalysts. Good work is not sufficient. Once we place a student on what is considered his instructional level, only his best is acceptable.

Parents' Part

In a continuous progress program, parents, too, have a distinct role. But unless they are informed, one cannot expect assistance from them. In this "Global Village" where public relations is all important, one must see that accurate information is transmitted. Using parish assemblies, home and school meetings, and informal get-togethers, the public was made aware of and fully endorsed our proposals. At the beginning of the school term a letter was sent home to every parent to give a further explanation of our work. Also, at each home and school session, a portion of our program or philosophy was revealed in depth. In some sections of our system, informal meetings were held in private homes to notify parents of school procedures this year. More in public relations has to be accomplished, but efforts to date have been fairly successful.

Principal's Part

Being principal of a continuous progress school adds extra burdens but also brings great satisfaction. One is directly responsible for implementation of a new philosophy and program. The added responsibility is compensated for by the greater flexibility the administrator has to use his initiative and creative powers in putting theory into practice. This system is very fortunate to have very fine educators heading its elementary school. Together with the supervisor, curriculum supervisors, reading consultant, and four other capable principals, I joined forces to help unify the system. We meet once a month to report on committee work and to discuss problems. The committees stem from those formed for outlining the skills. Once the skills were outlined and turned over to us, we immediately started to build our programs in language arts, French, and mathematics around them.

Within my own school, I plan and direct the actual implementation of the programs devised, help in pupil instruction, and do the book work for the evaluation of pupil progress. I feel much has been accomplished in this, our first year, but I am impatient. There seems to be an insurmountable number of tasks to be done. With great anticipation, I look to the future for bigger and better things in this ever changing educational process.

Program

As one considers each individual, one must find an approach to learning that suits him. In analyzing the existing language arts program, we have found that the basal text approach to learning is not the answer. There are two reasons for this:

(a) Although the skills are well-defined and presented in logical sequence, we find that many of our students cannot proceed from one level to another without a co-basal or intermediate text at certain points.

(b) The approach and content in some of the basal series are out of date, totally uninteresting, and not relevant to today's world.

Another major weakness we have found is in the readiness program. Here it was necessary for us to devise what we considered to be a total preparatory course for beginners. This includes all the auditory and visual skills plus kinesthetics. It encompasses the first five levels of our eighteen level program. Next year in our system we plan to use a tri-basal approach as far as textbooks are concerned. This is to be combined with a language experience approach to reading. The tri-basals were chosen from a series of nine different texts and copies. The other six publications will be made available in our system on a reduced scale.

Our basal mathematics text is chosen from the Addison-Wesley Mathematics Series. Next year two other series are to be employed as co-basals for remediation and enrichment. We have found many problems in using only one mathematics series, and we feel that for our program to be totally comprehensive, the needs of pupils in mathematics must be met to a higher degree. Definitions of the fundamental mathematical skills and operations by the teachers' committees has provided us with the organizing elements for the mathematics program. As head of the Mathematics Committee, it is my duty to see that a program suitable for our system is devised and ready for next semester.

Our location in a bilingual center demands that French play a greater role in our school system. In the past, French programs have been anything but continuous and, as a result, much indifference was generated toward the learning of this language. For English speaking people we offer a new oral approach, teacher devised, but directed by the French Curriculum Supervisor. This program is geared to meet the needs of our students. The program presently being introduced for French speaking people follows the same direction as the English series. There are three pre-primers and a continuing series of books which develop the skills in French much the same as in English. Here too, we are trying desperately to develop a suitable readiness to prepare our students to achieve better. In the near future, we can foresee branching out to co-basal texts since this basal series alone will not adequately meet the needs of our French population.

Social studies and science are not treated as yet in the continuous progress vein. Once French, language arts, and mathematics have been developed, these two subjects will come to the foreground. However, notable improvement has been made in adapting new ideas and concepts into the social studies area. We wish to make these learning experiences more meaningful for the students and have them gain a broader knowledge of the how and why of things which affect their daily social lives.

Art, music, and physical education, though a necessary part of one's total development, have not been correlated with the other disciplines. As soon as satisfactory progress has been made in programming the three main disciplines, further attention will be given to the role of these special disciplines in our totally comprehensive plan.

Pupil Evaluation

In our system we like to think that our evaluation is more comprehensive than in most systems. Primary emphasis is placed on qualitative teacher evalutions, both written and oral. A formal report card has been devised containing level indicators, a personal development profile, materials used, teachers' written comments, and an area for parental response. There is also a written report on pupil progress based mainly on teachers' comments. A comprehensive record of each pupils' personal and social development is kept in his file in the office. Finally, a profile of each pupil's achievement in the skill areas in the various disciplines is kept.

Reporting to parents is done three times a year on a formal basis. This report is followed by a parent-teacher night, during which time a student's total development is discussed. This is a very effective device in that it helps both parents and teachers to better understand pupil problems as well as interests. Parental inquiries are encouraged throughout the year, and a fair number of parents take advantage of this.

Conclusion

After only eight months of working on the actual implementation of this program, it would be impossible to give a true evaluation of it, but let me just pass on a few observations:

(a) Students who under a graded structure would have been labeled "potential dropouts" now find a purpose to school and can see notable progress being made because of individual treatment.

(b) True teaching is being carried on as teachers use their new materials and new approaches with greater freedom as the graded barriers break down.

(c) Parents of slow learners note a change of attitude and interest on the part of their children. Now, too, brighter children will not be held back as enrichment material is readily available to promote and encourage their interests.

(d) In summation, the result of our efforts has been an increasing interest on the part of students, greater involvement in modern educational instruction on the part of teachers, and an upsurge in the entire educational process.

With the maturing of teachers, parents, students, and myself in both the philosophy and general application of the theory of continuous progress, I am confident that we are nearing the stage of offering a first rate elementary program tailored to meet the needs of each individual child.

Chapter III

PROCESSES AND PROBLEMS INVOLVED IN IMPLEMENTING NONGRADEDNESS IN TRACADIE CONSOLIDATED ELEMENTARY SCHOOL

Why Change The Traditional Program?

The elementary school each year opens its doors and welcomes into a strange, new world five-year-old children who for the first time become cut off from the security of a mother's presence. Each is a bubbling fountain of curiosity and desires to experience, investigate, discover and understand the world in which he lives. Each is a unique individual, through interaction of inborn capabilities and a socio-economic environment, and has a growth pattern and rate characterized by spurts, levels, and lags peculiar to himself. These children come to school with varying degrees of readiness to begin formal instruction, hopefully, in an atmosphere free from fear, anxiety and frustration. Has our present system of graded vertical organization permitted the freedom, flexibility, and inventiveness necessary for the teacher to provide for the individual differences of the children served?

The present vertical organization, dictating that all children of the same age must learn a prescribed body of knowledge in a specific period of time, has led to pressures, frustration, and emotional disturbances for some, while for others, the result has been boredom, mediocrity and underachievement. On the one hand, we have children who need longer periods than others to acquire the same subject skills, but we have been forcing them to meet deadlines rather than building upon their readiness for subsequent learning. In forcing these children to attempt achievement beyond their learning rate and capacity, we have lowered them to the bitter level of failure with the penalty of repeating the complete set of skills using the same instructional materials and probably the same techniques. These children have to travel the same route in the same way in their search for achievement in grade designated skills in the various subjects. Such repetition has produced frustrated children whose self-image deteriorated to the point where emotional blocks have tended to close off conscious, deliberate effort to overcome failure to achieve. On the other hand, the system has forced many superior students to achieve at the pace of the average, to the end that their curiosity, enthusiasm, and interest in learning has become fossilized.

Most elementary school teachers have been quite aware of the problem of providing for individual differences in the graded structure. They have established grouping procedures leading to and providing varying degrees of individualized instruction in the area of reading and to a lesser extent in mathematics. This has served to create a further awareness of the need for a system that would permit realistic approaches through vertical and horizontal reorganization.

Evolutionary Move From The Traditional Program

Tracadie Consolidated School is an elementary school from primary to grade six with an enrolment of 377. These pupils are assigned to fourteen regular classrooms and one opportunity (auxiliary) classroom. The full-time staff consists of a principal, fourteen regular teachers and the following specialists—one reading specialist, one special education (opportunity class) teacher, and one physical education instructor. There are also two teachers on circuit—one for music, and one for art.

The idea of using the nongraded philosophy as a basis for the school program has evolved from the individual teachers themselves. This was done because of the concern on their part for the individual students with whom they were working. The teachers found that many of their students were dropping out of school before they reached senior high level. The children with whom they were dealing were living in an economically depressed area, and education was their only commodity.

Many of the teachers in the past had worked in multi-graded classrooms and now realize that they will have to practice some of the grouping principles they had formerly employed. Most of the teachers also realized that it was impossible for all children to reach a standard set by the province. To fail a child who could not meet the standard was defeating the purpose of learning.

The teachers employing these grouping practices soon came to realize that the children in these different groups could not be expected to handle the same material at the same rate. But they ran up against a very serious problem in the form of the money allotted to buy textbooks. All textbooks were provided by the province, and each child was allotted only one book. If he failed to acquire the necessary skills presented in that book, then he had two choices: 1) to repeat the same matter, or 2) to move to the next text with insufficient preparation. Because both of these alternatives led to frustration on the part of the students, the teachers looked for a better system.

The school had available to it a remedial reading instructor. This resource person had over a period of three years started to build a reading resource center. The teachers now had some material with which to work. Each year more material became available to them, and the teachers now had several sources from which to gather material. This made it possible for the teachers to group the children and provide the proper materials for them. Because most of the children had completed either satisfactorily or unsatisfactorily the basal reader, it was imperative that this material be available to the teachers in order to do developmental work and enrichment work.

It was decided last year at a staff meeting to group the children homogeneously for the language arts program. Most of the teachers felt that it would provide a more wholesome atmosphere for the students if homerooms remained heterogeneously grouped. With two teachers working at each grade level, this became possible. In June the teachers who had taught the students that year met with the teachers who were to work with the students the following year. On the basis of achievement test results and teacher judgement, the children were placed in groups for the language arts program. Some of the teachers decided to carry this grouping into the area of mathematics also. The number of students that the teacher had to deal with no longer became a main concern. She was now concerned with how effectively she could teach the group to which she was assigned. In September a few adjustments were made with the groups.

The teachers now found that with homogeneous grouping they were more inclined to work with smaller groups. Many of the teachers found that the basic reading course could be taught to the entire group. From this group they developed sub-groups to reinforce some area in which the child was weak. They also found that challenging work could be provided for superior students.

To illustrate how intricate this grouping became, I will take a sample grade IV class and explain the way these children were allocated. (Refer to Chart 1, p. 26)

The top group in grade IV consisted of 25 students. As a total group these students handled the basal reader, **Adventure Awaits,** phonetics, sequence, comprehension, syllabication, word attack skills and spelling. From the main group five sub-groups developed. Ten of these children needed remedial work in sounds. This was accomplished with the use of a text called **Dr. Spello.** At the same time the remaining fifteen did work to reinforce the skills already attained. These exercises came from a variety of texts. Each child was assigned a diagnostic or skill textbook to meet his particular needs. He worked on these books at his own pace. The child competed only against himself. It was found after testing was completed that all children in this class were weak in vocabulary and word meaning. It was decided to discard the reader and have a concentrated program of vocabulary development. One child who had an exceptional vocabulary was assigned work on an independent level.

Chart I

MEANS OF GROUPING NOW EMPLOYED

10
Remedial Work
in Sounds
Dr. Spello

5
Tom Trott
16
Uncle Ben
4
Adventure Trails

Basal Reader
Phonetics
Sequence
Comprehnsion
TOTAL GROUP 25
Syllabication
Word Attack Skills
Spelling
Average to Superior Level

15
Further Work
to Reinforce
Skill Already
Attained

Work on
own Level
Grammatical
Skills

1
Independent
Work
Level 3 (Spectrum)
24 Level 2
Developing Skills in
Word Aattack
Word Meaning

The rest of the group worked with the Lee C. Dughton **Vocabulary Development Reading Spectrum.**

Along with the vocabulary development program, a system of free reading was also initiated. The children in the class pooled all their books from home. Surprisingly, many of the children who had not read a book before now become interested in reading. These classes became a favorite of many of the children.

The children reacted most favorably to this type of program. It was pointed out to them that this program was for their benefit, and if they were finding the program too difficult, then some other level of work, even though it was on a lower level, would help them to achieve more quickly. They readily accepted this and became contented to do work at their own level. The teacher and the children now became a team working towards a goal. They ceased to frustrate one another.

Progress Toward A Nongraded System

Early in the year several members of the staff along with the principal were discussing the possible steps that could be taken to further our evolutionary movement towards further flexibility and relevancy. Various questions were brought to the forefront: Ex: Were the methods that we were then employing satisfactory? Would the implementation of a nongraded program most successfully meet the needs of our students?

Much enthusiasm was engendered by an Institute at St. Francis Xavier University during the first three days of the school year. A number of the leading proponents of this innovative educational system had presented this philosophy in an impressive manner. It was decided to bring to the full staff the proposal that we should enter a period of study and discussion leading toward the possible implementation of this system. Although some were understandably hesitant about this venture, they were willing to learn and became less apprehensive as discussion progressed. It was suggested by the principal that the staff be broken into several committees to study various aspects of the proposed program. Four committees were drawn up: Committee I was to discuss what form the continuous progress system was to take in this particular school and where and when acceleration and deceleration was to take place. Committee II was to develop a profile form to be used to indicate the instructional level of each pupil. Committee III was to develop a method for continuous evaluation of pupil progress and more effective methods of reporting to parents. Committee IV was a committee of the whole to specify what the curriculum should be used for each level in the language arts area.

The staff as a whole had decided to choose a system that would fit the particular needs of their students. The first and most difficult job was to assess the students with whom they were working. Committee II met and studied the cumulative record cards of their students. They found these cards did not present a clear picture of the ability and achievement of the students. It was decided therefore, to develop a profile on each student. The committee then proceeded to draw up a folder which would include in it space for I. Q. scores, achievement test scores, and teacher evaluation of each individual child. (Refer to Chart 2, p. 9) Each teacher was then given a profile sheet to complete for their students. The teachers found many of the Ginn Tests that had been given over the years, and along with the cumulative record cards, completed these profiles to the best of their knowledge.

When the profiles were completed, the individual grade teachers met with the committee and tentatively grouped the children into three categories—beginning of a grade, middle of a grade, needing remedial work at a certain grade level. With this grouping, Committee I could now devise a system that would fit the particular needs of their students. After studying four different systems, it was decided at a meeting of the whole staff to choose system D. (Refer to Chart 3, p) The teachers found this provided for the slower students as well as the brighter pupils. If the child failed to attain the necessary skills in a time limit that would be reasonable for him, he would have an opportunity to gain these skills in the transitional or remedial level. On the other hand, if the child completed the work at a superior rate, he would be given an enrichment program to allow him to progress at an appropriate pace.

Committee I discussed the grades that should be involved in the initial program. It was decided that the primary to six area should be included. The Committee also discussed the possibility of nongrading all subjects in the initial year, but this idea was discarded in favor of nongrading the language arts program only. It was realized that we had more materials with which to work in that area, and that the preparation time for such an all inclusive move was not sufficient.

Committee III is presently studying samples of report cards adopted by schools with similar systems. With the help of these

CHART II

PUPIL'S BASAL READING TESTS NAME____________ BIRTHDATE __________

Pre-Reading Test	Vocabulary	Tactile-Visual Readiness	Visual Readiness	Auditory Readiness	Comprehension Readiness	TOTAL
Possible Score	16	15	15	16	8	70
Average Score	15 – 16	14 – 15	12 – 15	14 – 16	5 – 7	60 – 68
Pupil Score	______	______	______	______	______	______

Pre-Primer Test	VOCABULARY		COMPREHENSION				TOTAL COMP.	TOTAL
	Word Recognition		Main Ideas	Sequence	Details	Concl.		
Possible Score	16		5	5	5	5	20	36
Average Score	15 – 16		3 – 5	3 – 5	3 – 5	3 – 5		29 – 33
Pupil Score	______		______	______	______	______	______	______

Little White House	VOCABULARY		WORD ANALYSIS		COMPREHENSION				T. COMP.	TOTAL
	Word Recognition	Context Clues	Initial Consonants	Ryming Words	Main Ideas	Seq.	Det.	Cons.		
Possible Score	15	10	15	15	5	5	5	5	20	75
Average Score	13 – 15	8 – 10	12 – 15	12 – 15	3 – 5	3-5	3–5	3–5		61 – 72
Pupil Score	______	______	______	______	______	__	______	______	______	______

On Cherry Street	Word Recognition	Context Clues	Initial Cons.	Cons. Blends	Stem. Words	Rym. Words.	Main Ideas	Seq.	Det.	Conc.	T. COMP.	TOTAL
Possible Score	30	8	16	9	7	15	5	5	5	5	20	105
Average Score	26 – 29	6 – 8	13–16	5 – 8	7	11–15	3–5	3-5	3-5	3-5		83–100
Pupil Score	______	______	______	______	____	______	______	____	__	__	______	______

STUDENT ______________ YEAR ______ TEACHER ______

CLASS PERFORMANCE

		Sup.	Av.	Below Av.	Poor
LANGUAGE ARTS	Reading –				
	Word Recog.				
	Word Attack				
	Co Comprehension				
	Lib. Skills				
	Spelling				
	Written Language				
	Oral Language				
	Creative Ability in Language				
MATHEMATICS	Understanding				
	Mechanical Skills				
	Problem Solving				
SCIENCE	Oral – Programme 1				
	Programme 2				
	Written – Programme 1				
	Programme 2				
SOCIAL STUDIES	Oral – Programme 1				
	Programme 2				
	Written – Programme 1				
	Programme 2				

STANDARDIZED ACHIEVEMENT TESTS

Norm	Result	Norm	Result

I. Q. TEST RESULTS

NAME OF TEST ______________________________ GROUP ____________

INDIVIDUAL ________

GENERAL RESULT ______________

STANDARDIZED READING TESTS

Norm	Result	Norm	Result

STUDENT ____________________ YEAR ________ TEACHER________

ATTITUDES – GENERAL COMMENTS

	No Difficulty	Extremely Good	Difficulties
Generally			

COMMENTS – Where Necessary

Chart III

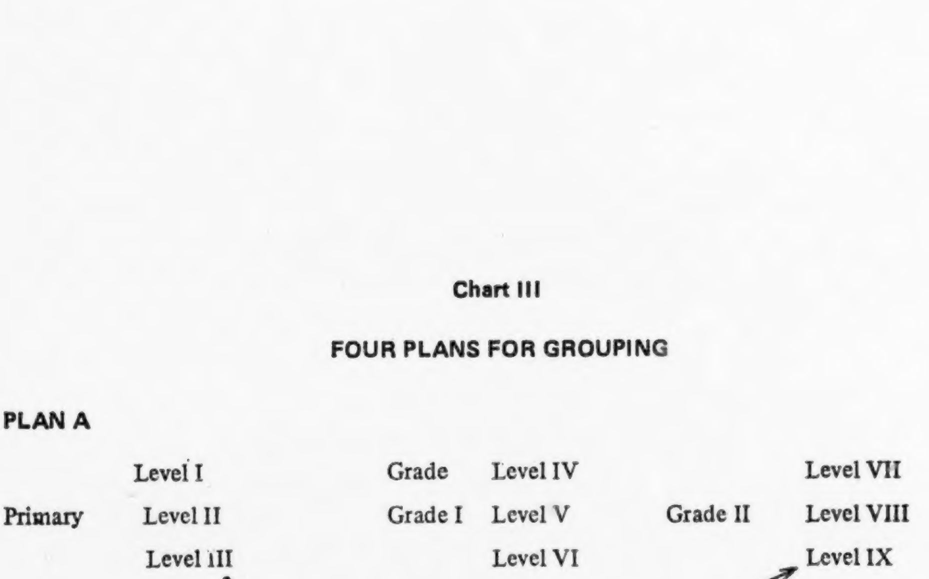
FOUR PLANS FOR GROUPING

PLAN A

	Level I	Grade	Level IV		Level VII
Primary	Level II	Grade I	Level V	Grade II	Level VIII
	Level III		Level VI		Level IX

TRANSITIONAL OR REMEDIAL PHASE

PLAN B


TRANSITIONAL OR REMEDIAL LEVEL
1
Basic
2
3
4
Curriculum
5
6
7
8
9
10
ENRICHMENT LEVEL

PLAN C

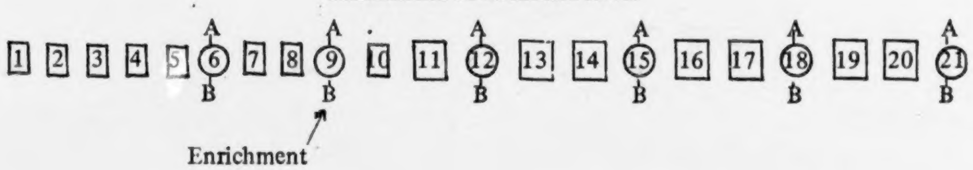
1 → 4 → 7 → 10 Slow Students

2 → 5 → 8 → 11 Average Students

3 → 6 → 9 → 12 Superior Students

"The Dufay Plan" Ungrading the Elementary School

PLAN D


Transitional or Remedial Level
A
B
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
Enrichment

samples they hope to draw up a reporting procedure that will meet our particular needs. The Committee is awaiting the outcome of the curricular adaptation. Committee IV is a group of sub-committees working to establish the curricular elements for each level. At present, although some of this work has been done, much of it remains to be completed. All the recommendations of these various committees have been weighed and ratified.

From the work we have now completed, we realize the process must continue to be an evolutionary one. We expect that the recommendations we have made for the coming year will be re-examined and revamped. It is understood by the staff that the mechanics of the system will have to be adjusted, readjusted, and refined to continue to meet our needs for the coming year.

Difficulties and Limitations

Setting up a nongraded system involves a number of problems. After attending the Nongraded Institute at St. Francis Xavier University, many of the staff members realized that they had been unconsciously working towards this goal. The first big problem that we met was to discover if the remaining members of the staff would be committed wholeheartedly to such a program. This problem was solved through discussion, workshops, and direct confrontation. It is only realistic to suppose that some would be hesitant to change a system in which they had been so secure.

A major problem of schools who are committed to the nongraded system is a financial one. The lack of financial resources available to school boards and schools is a serious one. When setting up this system, it is imperative to have a good library and/or resource center. Our resource center at the school is very limited but, despite this fact, we have decided to make maximum use of the materials now available and to augment this supply each year by any means possible. Present policies with regard to choice of basal and co-basal texts do not give sufficient flexibility to accommodate the reading achievement of the pupils.

Following our decision to initiate the continuous progress system in the language arts area from primary to grade six, we had to decide the shape that this program was to take to meet our particular needs. After the staff as a whole had chosen the system which proved best in their estimation, we grappled with the problem of devising a procedure to follow in the movement of pupils. The staff was most concerned that this system would not become another lock step system broken into smaller blocks.

A major problem area in an elementary system is the release of teachers from classroom responsibilities during the school day for the purpose of program planning, consultation, and pupil evaluation. This problem may be overcome to a certain extent by suitable scheduling of specialist teachers, by large group instruction, and by class monitoring through the use of teacher aides. Through the nearby university teacher-training program, we have been able to release some teachers this year for programs such as these. It was found that meetings after school were not satisfactory because of duty schedules and mental fatigue. It became necessary to have weekly staff meetings at night. These were most satisfactory, but it was found that these could not be held sufficiently often. It is going to to be necessary to have in-service days for this staff for purposes of orientation and evaluation of the program. This should take place periodically during the year.

The program had been drawn up when it was found that four members of the staff who had played a key role in its development were leaving the school. At this time it was necessary to decide whether to initiate the program the following year or to wait another year. It is not known as yet what effect this might have on the overall program, but it is probable that some parts of the program may have to be retarded pending orientation of new staff members.

With the break in the school year at Easter, there had come a slowing down in the developmental process of our nongraded program. The committee dealing with the assignment of levels to classroom teachers has not had an opportunity to present their proposals to the whole faculty for assessment, possible adjustment, and final ratification. This phase, however, will be completed without difficulty.

Because of lack of expertise in curriculum development, there has been delay in assigning the curriculum content to levels. Basically, the curriculum will probably be geared to the basal reading program with adaptations from the curriculum guides presently in use. Incorporated into this reorganization should be guidelines and suggestions as to the use of basal texts, co-basal texts, and other language arts materials now available to us. This is essential if we are to individualize instruction to meet the needs of each child according to his abilities, experiences, interests and attitudes, and achievement.

It might be stated here that the teachers in this school have come to realize, as others have done, that an inadequate approach to individualizing instruction in the first year of school has created many of the reading and language problems discovered later on. The uniqueness of the individual, from the point of view of such factors as intelligence, physical and social maturation, and cultural background demands that he not be forced into a formal reading program until he is ready. This matter of readiness to enter formal reading is even more critical than the readiness to pursue subsequent sets of learning skills. The reason why more boys than girls have reading problems stems not from the lack of recognition of the problems so much as the inability or the failure of the school to adjust the program sufficiently to individual differences.

The present period seems one of psychological lethargy resulting from the cutback in the monies available to the local education authorities. This has placed further and more severe limitations upon expenditures for instructional materials. Despite this turn of events, the concern and ability of the staff will no doubt enable them to overcome these difficulties, at least to a degree.

Chapter IV

THE TRANSITION FROM GRADING TO NONGRADING IN ST. MARY'S SCHOOL, TRURO

Proposal

The reorganization of the Primary Department of St. Mary's School, Truro, Nova Scotia, from a fully graded structure to a nongraded program evolved from a study made by the staff of the possibility of providing optimum learning opportunities for each individual in the school. It was discovered that repeated failures on the one hand, and lack of challenge on the other, had been both frustrating and wasteful to a number of students; that many students were not progressing according to ability, and that a new approach, which at best would be but an experimental endeavor, seemed to be the only answer to our problem.

PROCEDURE

Organization

The first teachers' meeting to discuss nongrading was held in April, 1969. Committees were formed to discuss nongraded programs already in existence, to order tests suited to evaluate pupil achievement and/or learning capacity, to procure professional reading on nongrading, and to decide which books and materials would be of most assistance in a nongraded program.

These matters were dealt with during the remainder of the school year—in some areas quite fully, in others with not so much success. Professional books were acquired, tests ordered, and two nongraded schools were visited. All teachers involved in developing nongradedness in St. Mary's School attended a three-day Institute on Nongrading at St. Francis Xavier University in early September.

Testing Program

In September and October, 1969, the teachers, with the assistance of the school's part-time reading specialist, undertook a comprehensive testing program, choosing from the following tests which had been purchased for the school those which seemed best suited to provide pertinent information:

1. Watson Reading Readiness, Prim., 1, 2
2. Dominion Learning Capacity, Prim., 1
3. Spache Diagnostic (Individual)
4. Stanford Diagnostic Reading, Gr. 2, 3, 4
5. Metropolitan Achievement, Gr. 1-6

Ginn Reading tests were reserved until such time as the students had completed a book in the basic reading program. Having evaluated student achievement, capacity, etc., periodic staff meetings were held to discuss the best approach to be taken from there. Teacher evaluation, based on personal observation of each student, was considered to be of paramount importance in the placement of students for optimum learning opportunity. This was based on the premise that while a student may be on grade-level according to a test result, he may in effect be lacking the required skills.

By early November, it was decided to nongrade the existing grades 1 and 2 only, choosing one discipline, that of language arts. A reading block was to be set up wherein interclass grouping could be carried out where feasible.

Informing Parents

A Parent-Teacher meeting was held in October to give the parents insight into the philosophy of nongrading by means of a talk, filmstrips, and discussion. At that time parents were also informed of the proposed plan for nongrading the school.

Books Provided

Ten sets of children's books were purchased to serve various purposes:

a) To stimulate interest in reading books with a low-vocabulary, high interest level were procured.

b) To provide enrichment reading for fast learners and to present reading skills in a different manner, supplementary books having the same basic reading skills as the books already on the course were purchased.

c) To reinforce the basic reading skills in a remedial program.

The following is a list of the reading materials now available in our school:

1. **Reading Lab Books** (for Primary grades) Series of 12.
2. **Frontiers of America** (high-interest, low-vocabulary) Series of 20 books.
3. **Dolch Readers,** 3 sets: A Dolch First Reading, Series of 16
   A Dolch Basic Book, Series of 16
   A Dolch Pleasure Book, Series of 11.
4. **Practice Readers,** Student books with stories and exercises, score card, Sets A, B, C, D, E (5 in. each).
5. **Spache Readers,** in three levels of difficulty; high-interest, low-vocabulary. **(Cowboy Sam Series).**
6. **Deep Sea Adventure** series (Spache Readers) Levels 1-3.
7. Phonics Skill texts on three levels.

   Young Canada Reading Series, complete with readers, teacher's manuals, and workshops. (T. Nelson books)
8. Supplementary Readers:

   Reading for Meaning Series, complete with readers, primary and gr. charts, teacher's manuals, and workbooks. (Houghton-Mifflin Series).
9. Supplementary Readers, Gage & Co.

In addition, books purchased for the school library were chosen with a view to stimulating interest in reading while at the same time providing information.

Levels of Work

Grouping for grades one and two came into effect in late November, with pupils placed where teachers felt they were ready to proceed. Groups were organized as follows: Grade one, three levels; grade two, three levels. No interclass groups were formed at this time. In December and January the teachers of grades primary and three respectively became interested in including their classes in the program. Having been tested along with the grades one and two in the early fall, and having undergone a re-examination through teacher observation, placing and grouping for instruction required little time. The readers and materials to be used to teach the various reading skills were selected and made available to all four classes. Each teacher compiled lists of the skills to be mastered in the three levels of work into which her grade was to be divided, using the Ginn Basic Readers as a guide. A copy was mimeographed for each child in the class, and an inventory kept of the student's mastery of each skill within his particular reading level. File folders containing all information pertinent to each child's achievement were to be kept.

With the inclusion of primary and grade three, the program now comprised twelve reading levels, two of which were inter-class groupings. Instruction was given by all four classroom teachers, the reading specialist, and school principal. After working for six weeks under this new setup, it became apparent to all that extra help was needed to do an adequate job. Three teacher-aides, teacher-interns from the Nova Scotia Teachers' College, volunteered their services, giving three hours a week to assist in the reading program.

Promotion

Promotion takes place when the student has mastered the work of his level. Simple "promotion cards" were prepared and mimeographed to be sent home to the parents, and informal parent-teacher dialogue was encouraged in order to keep parents informed as to their child's progress.

A READING LEVELS PLAN: RATIONALE

Among educators of school children, it is an established fact that profound individual differences are the rule rather than the exception in any group of learners. This is most obvious in the area of reading. Because reading is the focal point of most, if not all early educational programs, it is not too difficult to understand why nongraded plans in present day education take their genesis from programs which are set up to encompass the vast differences that exist in reading readiness, progress, and achievement.

The establishment of reading levels programs, continuous reading progress plans, nongraded primary reading plans, etc., are rational organizational extensions of the philosophy which underpins dealing with individual differences in learners in the area of reading. To confront all learners with the same sets of materials, the same goals of attainment, the same number and intensity of concepts, and the same set of teaching approaches and procedures is to doom too great a percentage of children to failure. Therefore, differential approaches to readers of differing abilities is a solid and scientific rationale for a nongraded reading levels program.

PROBLEMS AND DIFFICULTIES

1. Teacher-pupil ratio. All classes in the Primary Department of the school are too large to do an adequate job on individualizing instruction.

    Primary — 39 pupils
    Grade 1 — 39 pupils
    Grade 2 — 33 pupils
    Grade 3 — 34 pupils

2. Books and materials are very costly. No financial help is received, except from money-raising projects held within the school.
3. Lack of enthusiasm (in the beginning) on the part of some teachers for this new venture, partly due to a fear of additional work, extensive planning, extra evaluative procedures, and a failure to take advantage of professional reading provided on nongrading.
4. Ordinary frustrations involved in getting organized.

EVALUATION OF PROCEDURE

Having experimented for so short a period of time, it is difficult to come to concrete conclusions as to the value of our procedure. However, at our most recent meeting, held April 8, 1970, the following questions were discussed, and some very worthwhile answers and conclusions emerged.

a) Have we accomplished anything worthwhile so far?

b) What changes could we bring about for the remainder of the school year to improve our program?

c) What materials could we use to give a greater challenge to the brighter pupils, and what more could be done for the slow ones?

d) What is the best way to evaluate pupil progress?

e) What additional materials are necessary now?

f) What changes do you foresee to be profitable for next year?

Answers to the first question were optimistic and enthusiastic. Slight changes were suggested in response to the second question. In response to question "c", a variety of reading materials was suggested for use with all levels of ability,—bright, slow, and average. In response to "d", teachers felt they needed to simplify their evaluative procedure because they were unable to cope with those set up in the beginning. Some team-teaching seemed feasible for next year. Also, the development of a "Reading Room", a "Math Room", and a "Social Studies Room" with teachers assigned to each discipline seemed to be an idea worth examining.

With the growing enthusiasm which has come due to the good results of our experiment, we feel that our objectives are being attained, albeit slowly. Teachers feel that pupils are being sufficiently tested, evaluated and followed up, with the result that they are placed at the level where they are ready to proceed and achieve.

Chapter V

THE NONGRADING OF THE LANGUAGE ARTS PROGRAM:

A PILOT PROJECT

Problems and Difficulties

Many difficulties have been encountered in planning to introduce continuous progress into our school system. One of the greatest of these was our inability to draw our supervisor actively into the planning. Although he expressed his belief in the program, due to the many pressing duties of his office, he has little time to meet with us. Because of this very few plans can be ratified officially.

Some of our teachers, although agreeing in principle, are reluctant to begin the program. They express various doubts. Most feel they know too little about the organization and implementation of continuous progress. They feel trained personnel should be brought in to instruct the teachers and to organize the curriculum. Another of their main concerns is lack of necessary materials to implement the plan properly. This does not mean that they desire the most expensive equipment, but only the very basic needs such as multiple texts, proper filing facilities, etc. As these materials have not been available to us in the past, they see no promise of receiving them in the immediate future in view of the government's cutbacks on educational budgets. We have no positive guarantee that the local school board is committed to establishing this continuous progress system. Any communication with the board has been strictly informal. We are willing to go before them to present our material about continuous progress, but as yet we have not been invited to do so.

A study of the children presently enrolled in our Primary Department showed a wide variance in reading levels due to differences in maturity, intelligence, and socio-economic background. Several of the children in each room are quite capable of reading from materials at much higher levels than are availble to them now. The Ginn series, which is the only series currently available to us, does not offer the challenge these children require. Several different series of co-basal texts were ordered from the Provincial Department of Education in Halifax this year, but the teachers hesitate to use them because of the curriculum set down which requires use of the Ginn Series. It is hoped that with implementation of continuous progress, a freer atmosphere will prevail and the teachers will feel free to use any and all materials available to them.

At the other end of the scale we have children who require a more simplified approach to reading with an extended readiness period and more time for skill reinforcement at each level. Under our present system these children suffer the humiliation of failure and taste defeat at the early age of six. With the continuous progress system we hope these children will be accommodated at their own level by providing materials that they are capable of using and by allowing them to master these materials at their own rate. The inauguration of a Head Start Program in this town should enable us to cope with the readiness need of immature beginners.

We plan to use team teaching at the beginning level, for we have observed that this gives teachers a better opportunity to analyze and reach the individual child more quickly. Games, rhythmic activities, oral language periods, storytime and mechanical skills can be handled in large groups while readiness activities are more effective when performed in smaller groups.

We felt that it was virtually impossible to conduct a continuous progress program under the present arrangements found in our schools. For this reason we suggested to our supervisor that the Primary Department of the Main St. School be moved to the Central Street School. This arrangement would give the seven teachers who would be involved in the pilot project an opportunity to work together for an entire school year before entering the continuous progress system. We will present our language arts program to them hoping that many suggestions and revisions will be offered to make it a workable plan for all involved. We hope that the other teachers involved will agree to a departmentalized approach, as this would seem to provide for the most economic use of materials and teaching time.

The costs of implementing a continuous progress system may seem quite high. However, we plan to keep costs to a minimum by making use of all the materials we have at present in our schools. Our reading specialist has assured us that we may utilize materials which she has. We plan to use acetate sheets which will make pupil workbooks reusable, and of course, much of the materials we will require can be duplicated. Films, which are quite essential to language development, are available free of charge from the Department of Education. When one considers the thousands of dollars now spent on adult retraining programmes by the Manpower Department, perhaps the costs of continuous progress education will not seem so prohibitive. If we have education for EACH person, if we reach EACH person during his formative years in our systems, then no future adult upgrading will be required.

Since we must have some basis for determining the ability levels of the children we teach, some testing must be done. We plan to use the Ginn Reading tests which indicate what a child has learned from the material presented to him, a Basic Word list compiled from readers children have used, and the Otis Quick Scoring Mental Ability Test to gain some indication of each child's ability.

We have a very mobile community here in Plainville because of the new industries which are building in our area. Children are entering our schools from all over Canada and the United States. The continuous progress system will allow us to integrate these children into our system with more facility than is now possible. We hope to be allowed to approach the heads of these companies for financial aid for our project.

The parents in our school district seem to be very interested and enthusiastic about our project. Through a series of newsletters we hope to keep them informed of our plans and hope in this manner to eliminate the doubts and misunderstanding which may arise regarding such a different educational concept.

After attending the Nongraded Institute at St. Francis Xavier in September 1969, we met with our Supervisor to discuss the possibility of introducing the continuous progress system. He was very cooperative, agreed with our plans in principle, and expressed the desire to learn more about it. Our meeting resulted in a successful effort to obtain the services of Professor Kuzsman of St. Francis Xavier University to talk to our elementary teachers regarding continuous progress. This was followed by meetings with the staffs of our respective schools to inform them of the events of the Institute. We found our colleagues interested, willing to investigate and learn, but concerned about the availability of funds to make such a system workable in our area.

In October, we met with Professor Kuzsman to discuss our objectives. In preparation for this in-service session, we prepared a paper outlining the philosophy of continuous progress. This paper was distributed to all the teachers. We encouraged them to have questions prepared to ask Professor Kuzsman. In October we met with the reading specialist in Plainville to discuss a possible selection of reading materials and placement tests. She was very helpful and assured us of her full cooperation in the event that the system is introduced.

In November Professor Kuzsman met again with all the teachers. He outlined the advantages of continuous progress education and also the hardships which the implementation of such a system would entail. He particularly emphasizes the need for commitment on the part of the participating teachers. The reaction to this meeting offered some encouragement. The teachers were enthusiastic about the plan and readily admitted the advantages such a plan would offer the children.

We obtained permission from the school board to spend a day in the Petit de Grat Elementary School to observe their continuous progress program in operation. We gained much practical information during this observation day and saw how even six-year olds can be taught to move from room to room. We also had a chance to speak with the district supervisor who had many helpful suggestions to offer. We visited the reading laboratory in Isle Madame District High School where we saw many materials which would be extremely useful in a continuous progress system.

In January we organized a Home and School Meeting with Continuous Progress as the topic and Professor Kuzsman as the guest speaker. The parents who attended were quite enthusiastic about the proposed system and indicated their eagerness for us to begin. An account of Professor Kuzsman's address appeared in the local press for the benefit of those people who were unable to attend.

The Mobile Reading Laboratory from the Nova Scotia Department of Education was in Plainville for a month. This gave us an opportunity to consult with the directors concerning materials useful in a continuous progress system. One of their suggestions which might prove useful was the use of acetate slip sheets with pupil workbooks. In this way materials can be used time and time again.

Throughout the school year we have attempted to develop teaching materials which would be useful for individualized instruction. We have of course experimented with these materials with our classes. The need for an appropriate physical setting in which to implement our plan led to a meeting of all the teachers who will be involved in the pilot project to discuss the physical changes which will be necessary to start the pilot school. Further meetings were lined up to work out more specific details. One of these was devoted to the study of various methods of recording pupil progress. No particular form will be suggested until all the teachers involved have been consulted and agree on a choice.

The Development of the Language Arts Program

The most fundamental subject in the nongraded elementary school is language arts; therefore, we propose to set up a nongraded language arts program containing all the language arts skills previously introduced in grades primary to three. To do this we have concentrated mainly upon reading, incorporating the language skills into levels which the child could master in one school term and further into phases within the term. We elected to do the language arts because we feel this is a most important area for the beginner. We believe that in order for the child to succeed in other skill areas he must have a basic competency in the fundamental reading skills. His knowledge of how to attack a new word and the development of his comprehension influences his learning rate throughout his school years.

In the pages that follow criteria for observing and analyzing a child's initial reading readiness are outlined followed by a sequential language arts program for all levels from reading readiness to what is now considered the end of grade three.

LEVEL 1 — PHASE 1

Initial Reading Readiness

Each child should be observed and analyzed in the following areas to determine his readiness for learning.

MOTOR DEVELOPMENT

1. Are his bodily movements well co-ordinated?
2. Does he hold a book and turn pages well?
3. Is his eye-hand co-ordination sufficiently developed to enable him to pick up articles accurately and follow a line? line?

AUDITORY DEVELOPMENT

1. Does he seem to hear what you read and say to the group?
2. Does he listen attentively?

3. Can he pass the 2-foot low voice test, and the 15-inch whisper test?

4. Does he hear and enunciate words accurately?

VISUAL DEVELOPMENT

1. Are there signs of eyestrain (blinking, squinting, watery eyes)?
   (a) at a distance? (b) near the eyes?
2. Does he tend to hold the book too close or too far from his eyes?
3. Does he see likenesses and differences in objects, letters, and words?
4. What does any available test show about vision?

SPEECH

1. Does he use baby talk or any immature speech patterns?
2. Which sounds does he not yet enunciate accurately?

GENERAL HEALTH

1. Does he tire easily?
2. Are there evident physical handicaps (eyes, ears, nose, throat, coordination)?
3. Are there any signs of poor health and malnutrition?

SOCIAL DEVELOPMENT

1. Does he like to work and play with his fellows?
2. Does he show leadership?
3. Does he co-operate and follow decisions of the group?
4. Does he like to hear his peers express their ideas?
5. Is he learning to be polite?

WORK HABITS

1. Does he stick to a task or a voluntary activity?
2. In taking directions, does he listen attentively and respond promptly?

3. Is he a neat, systematic, careful worker?

MENTAL DEVELOPMENT

1. Can he pay careful attention for several minutes?
2. Does he have a good memory?
3. Is he resourceful in solving his problems?

EMOTIONAL DEVELOPMENT

1. Is he withdrawn, shy or overly aggressive?
2. Is he at ease in the school situation?
3. Is he self-reliant and confident?
4. Is he a happy, alert child?

BACKGROUND OF EXPERIENCE

1. Does his family customarily speak English?
2. Is the child included in family planning and conversation?
3. Do both parents work?
4. Do they take the child on trips?
5. Do they discuss pictures and read to him?
6. Does he have playmates, pets, toys, books, tools?

LANGUAGE DEVELOPMENT

1. Does he have a reasonably wide vocabulary?
2. Is it based on well-understood concepts?
3. Does he enunciate and pronounce words clearly and correctly?
4. Does he speak in full sentences?
5. Does he tell a story in good order?

PRE-READING INTERESTS AND SKILLS

1. Does he pretend to be reading when by himself?
2. Does he voluntarily go to books and look through them?
3. Can he read the story that a picture tells?

4. Does he notice and recognize common signs and labels?
5. Does he know numerous stories and rhymes?
6. Is he curious about new notices that the teachers have put up?

This analysis of the individual child should take place during the first few weeks of school through observations of his performance in group activities, games and play periods. The school nurse checks the primary children each September for physical problems relating to general health, hearing and eyesight.

LEVEL 1 — PHASE 2

Reading Readiness

WORD RECOGNITION SKILLS

1. Builds visual discrimination.

   a) Observes differences and similarities in shapes of things: differences in size of things, colors, pictures; differences between letters and words.

   b) Observing likenesses and differences between letters (beginning sounds) and words.

2. Building auditory discrimination.
   a) Identifying sounds — whistling, tapping, singing.
   b) Identifying differences between sounds.

   c. Recognizes words that rhyme.
   rhymes.

   d) Hears similarities and differences between beginning sounds and words.

3. Identifies, reads, prints own name.

4. Matches capital and small letters, letter names, forms letters.

5. Observes and understands left to right sequences.

6. Classifies objects into categories (foods, animals, etc.).

7. Draws or places pictures in a sequence of events; retells a story in sequence.
8. Eye-hand coordination (pasting, coloring, cutting, following lines).

COMPREHENSION SKILLS

1. Retention—remembering main characters and events in a story etc. Memory of orientation of forms.
2. Follows directions to do or find specific things in games or printed material.
3. Listens attentively.
4. Understands opposites—top, bottom, stop, go, etc.

INSTRUCTIONAL MATERIALS

Fun with Tom and Betty — Ginn

The Big Book — Scott-Foresman (Gage)

We Read Pictures — Scott-Foresman (Gage)

We Read More Pictures — Scott-Foresman (Gage)

Before We Read — Scott-Foresman (Gage)

Self-made materials such as stencils, concrete and semi-concrete materials, Films from Department of Education, records, music and stories are also recommended.

LEVEL 1 — PHASE 3

Pre - Primer

WORD RECOGNITION SKILLS

1. Uses context clues to figure out unknown words.
2. Recognizes 2 words out of 3 that rhyme in pictures and orally—rhyming phonograms.
3. Understands plural function of "S".
4. Recognizes similarities and differences in beginning sounds, words, phrases, sentences.
5. Learns names of all letters of alphabet, capital and small; proper formation of letters.

6. Uses configuration clues.

COMPREHENSION SKILLS

1. Reads silently without symptoms of tension such as finger pointing, lip movement, etc.
2. Understands main idea of a story.
3. Follows a sequence of ideas in a story and arranging pictures in sequential order.
4. Identifies the speaker in a story or in a conversation.
5. Follows a simple series of directions or work sheets.
6. Decides which words tell opposite ideas, such as in—out, stop—go.
7. Makes inferences.
8. Contributes to group—dictated story based on a sequence of pictures.
9. Classifies ideas, such as toys, colors, etc.
10. Recognizes most of the vocabulary in three pre-primers.
11. Reads independently with interest and understanding.

INSTRUCTIONAL MATERIALS

Little Red Story Book — Ginn
Little Green Story Book — Ginn
Little Blue Story Book — Ginn
My First Book — Ryerson
Now We Read — Scott-Foresman (Gage)
Fun With the Family — Ginn
Fun Wherever We Are — Ginn
Independent reading activity pages

ENRICHMENT MATERIALS

Come with Us — Ginn
Early Start — Pre-school Readers—Wonder Books
Dr. Seuss Series — Beginners' Books — Random House

LEVEL 2 — PHASE 1

Primer

WORD RECOGNITION SKILLS

1. Makes auditory and visual discrimination, initial consonants, sounds and blends, final consonant sounds, median consonants, rhyming phonograms and their vowel sounds.
2. Makes configuration—in isolation and by comparison. Notes general configuration of words, Looks for striking characteristics such as tall letters and 2 letters alike.
3. Uses Nouns and verbs with "S" ending.
4. Blends the first consonants of a word with the rhyming or last part of another word to make a word. Ex: look-book.
5. Recognizes inflectional variance formed by "s", "es", "ing", "ed", "s".
6. Recognizes known parts in compound words.
7. Recognizes variants ending in "s", "ed", and "ing".
8. Uses picture clues in recognizing words.
9. Uses context clues to determine words.

COMPREHENSION SKILLS

1. Reads and answers questions.
2. Locates answer to questions.
3. Draws conclusions based on events in a story (what will happen next?).
4. Interprets ideas implied but not directly stated or pictured.
5. Notes details — colors, sizes, etc.
6. Follows one step — two step directions.
7. Recognizes emotional reactions and motives of story characters — happiness, sadness, anger, etc.

INSTRUCTIONAL MATERIALS

Little White House — Ginn

On My Way — Ryerson

Fun with Our Friends — Scott-Foresman (Gage)

ENRICHMENT MATERIALS

Under the Apple Tree — Ginn

Early Start — Pre School Readers — Wonder Books

Dr. Seuss — Beginner Books — Random House

Easy Readers — Wonder Books

LEVEL 2 — PHASE 2

INDIVIDUAL ABILITIES AND SKILLS

1. Makes frequent use of the library to obtain books for information and enjoyment.
2. Chooses books for purchase for himself and others.
3. Browses at the book table to good purpose.
4. Begins to read more factual material in books and other sources.
5. Becomes more selective in his choice of books.

WORD RECOGNITION SKILLS

1. Knows the digraphs **ch, sh, wh, th,** and whether they appear at the beginning or end of words.
2. Learns the short sounds of the vowels.
3. Blends consonants and vowels.
4. Learns the word families **ad, ag, and, ame, ace, aw, an, air, any, ast, ed, ear, ick, ip, ive, old, op, ound, oy, own, oom, un, ust, ut.**
5. Learns the vowel digraphs.
6. Learns the principles governing vowel sounds, but not as rules to be memorized.
7. Learns to recognize words formed by adding y as a suffix.
8. Learns the vowel dipthongs **ou, ow, oi, oy.**
   kn, gh, gn, wr.

9. Learns to recognize the silent consonant in the digraphs kn, gh, gn, wr.
10. Learns the variant sounds of the vowels as used with **r, w, l.**
11. Learns that **y** is changed to **i** to form the plural of many words.
12. Learns that **f** is changed to **v** to form plurals.
13. Learns that the consonant may be doubled before the ending.
14. Learns that the final **e** may be dropped before the ending. the suffix **er** or **ly.**
15. Learns that new words may be formed by the addition of the suffix er or ly.
16. Knows contractions from which one letter has been omitted.
17. Learns the use of italics and bold-face type.
18. Learns the use of abbreviations as in **Mr., Mrs.,** etc.
19. Identifies root words, supplies synonyms, antonyms, homonyms.

COMPRENSION SKILLS

1. Locates and compares sources of information.
2. Dramatizes, illustrates and retells a story well.
3. Begins to distinguish between the real and the fanciful.
4. Learns to recognize paragraphs.
5. Begins to see cause-effect relationships.
6. Begins to employ sensory imagery.
7. Begins to read simple maps, charts, globes with much help from the teacher.
8. Begins to write simple stories of his own creation.
9. Relates ideas from reading to personal experience.
10. Acquires simple dictonary skills; alphabetizes by first letter.

INSTRUCTIONAL MATERIALS

On Cherry Street — Ginn

More Fun with our Friends — Scott-Foresman

See Me Go — Ryerson

ENRICHMENT MATERIALS

Open the Gate — Ginn

Easy Readers — Wonder Books

Dr. Seuss — Beginner Books — Randon House

LEVEL 3 — PHASE 1

INDIVIDUAL ATTITUDES

1. Exhibits curiosity which can be satisfied through reading.
2. Reads in greater depth on various topics of interest.
3. Begins to extend reading interests to include many categories.
4. Enjoys reading to others.

WORD RECOGNITION SKILLS

1. Learns the sounds for the combinations **kn, gh, gn, wr,** at the beginning or ends of words.
2. Understand the use of the soft **c** and **g.**
3. Learns the three letter blends: **thr, spr, str, scr, squ, spi.**
4. Can form new words by substituting vowels, consonants, consonant blends in various positions.
5. Can build upon the root word by adding suffixes.
6. Is able to identify the root word in an affixed word.
7. Understands the effect of the final **e** on vowel sounds.
8. Understands the effect of the **r** on vowel sounds.
9. Know possessives, singular and plural.
10. Knows many contractions.
11. Has developed several word-attack methods.

COMPREHENSION SKILLS

1. Gathers and organizes information obtained from reading.
2. Summarizes information.
3. Makes associations based on reading.
4. Recalls and retains information from reading.
5. Draws and verifies inferences from reading.
6. Understands cause and effect relationships.
7. Evaluates what he reads in terms of authenticity, truth and depth.
8. Begins to appreciate and understand the use of dialect, foreign words, and idiomatic and special vocabularies.
9. Can extend concepts of time and space gained through reading.
10. Begins to spell basic words.

INSTRUCTIONAL MATERIALS

We Are Neighbors — Ginn

Friends Old and New — Scott-Foresman (Gage)

ENRICHMENT MATERIALS

Personal Reading — Scott-Foresman (Gage)

Magic and Make Believe — Book 1 — Nelson

LEVEL 3 — PHASE 2

INDIVIDUAL ATTITUDES, INTERESTS, AND SKILLS

1. Makes wide use of dictionary and begins to use the encyclopedia.
2. Learns the effect of **l, u,** and **w** on vowel sounds.
3. Learns the suffix endings **ed, est, ing, y, self, n, en, er.** correctly in speaking and writing.
4. Learns the prefixes **a, be, un, re, in, dis.** speaking and writing.

WORD RECOGNITION SKILLS

1. Learns to discriminate between words similar in form.
2. Learns the effect of l, u, and w on vowel sounds.
3. Learns the suffix endings ed, est, ing, y, self, n, en, er.
4. Learns the prefixes a, be, un, re, in, dis.
5. Learns to recognize words by substituting one medial vowel for another.
6. Understands the principles for determining vowel sounds.
7. Learns to combine identification of vowel sounds with context clues.
8. Begins to recognize syllables and accent.
9. Identifies root words in inflected and derived forms.

COMPREHENSION SKILLS

1. Identifies and evaluates character traits.
2. Identifies the mood or tone of a passage, story or poem.
3. Reacts to the mood or tone of a passage, story, or poem.
4. Projects mood or tone in reading orally.
5. Recognizes the distinctiveness of poetry.
6. Applies locational skills previously taught.
7. Learns about chapter and section headings, glossary and index.
8. In using the dictionary, uses sentence context to determine appropriate meaning.
9. Begins to use the encyclopedia.

Around the Corner — Ginn

More Friends Old and New — Scott-Foresman (Gage)

Sounds of the Storyteller — Holt, Rinehart & Winston

ENRICHMENT MATERIALS

Invitational to Personal Reading — Scott-Foresman (Gage)

Ranches and Rainbows — Ginn

Magic and Make Believe — Book 2 — Nelson

LEVEL 4 — PHASE 1

WORD RECOGNITION SKILLS

1. Understands the use of the apostrophe.
2. Understands the use of the principles of syllabication.
3. Has good auditory perception of syllables.
4. Has good auditory-visual perception of syllables.
5. Has good auditory perception of accent.
6. Understands that accent effects vowel sounds.
7. Uses meaning clues to determine accent.
8. Notes visual clues that help determine accented syllables in words.
9. Notes the similarity of sounds **x** and **cks.**
10. Blends syllables into whole words.
11. Recognizes words formed by adding prefixes or suffixes **un, or, ish, ful, ly, en, ier, lest, ily, less, ful, ment, ness.**
12. Understands the use of the hyphen.
13. Learns what the **schwa** is and how it is used.

COMPREHENSION SKILLS

1. Perceives the relationship between ideas within a sentence.
2. Understands the sentence when phrases or clauses complicate the sentence pattern.
3. Understands the sentence when the word order is inverted.
4. Understands how punctuation marks clarify meaning in complicated sentences.
5. Recognizes over-generalizations and over-simplifications.
6. Begins to distinguish between emotional and critical writing.
7. Understands many abstract concepts, the use of exaggeration, implied meanings.
8. Begins to evaluate the qualifications of the author.

INSTRUCTIONAL MATERIALS

Finding New Neighbors — Ginn

Roads to Follow — Scott-Foresman (Gage)

ENRICHMENT MATERIALS

The New Tall Tales — Scott-Foresman (Gage)

Treats and Treasures — Nelson

Readers Digest Skill Builders — Revised Edition 3

LEVEL 4 — PHASE 2

INDIVIDUAL ABILITIES AND SKILLS

1. Develops habit of reading critically.
2. Develops a flexible rate of reading to accommodate the material read.
3. Understands the need for a flexible rate.
4. Carries the reading skills over to content materials with ease.
5. Recognizes that there are differences between the reading of narrative materials and expository materials.

WORD RECOGNITION SKILLS

1. Perceives primary and secondary accents.
2. Can alphabetize to the fourth letter and beyond.
3. Begins to use and understand diacritical markings.
4. Knows many hyphenated and compound words.
5. Learns the variant sounds of **c, g, gh, s.**
6. Knows theuse of the silent consonants **w, h, g, gh, k, b, l.**
7. Understands the principles governing the syllabication of blends and digraphs.
8. Knows the irregular verb forms.
9. Performs with high degree of accuracy on review tests of all phonetic and structural analysis skills.

COMPREHENSION SKILLS

1. Raises points of story as evidence of criticism of appraisal of characters and actions.
2. Demonstrates increasing maturity in the use of previously learned comprehension skills.

INSTRUCTIONAL MATERIALS

Friends Far & Near — Ginn

More Roads to Follow — Scott-Foresman (Gage)

ENRICHMENT MATERIALS

Open Roads — Golden Rule Series

Readers Digest Skill Builders — Revised Editions 3 2 and 3 3.

LEVEL 5 — PHASE 1

INDIVIDUAL ABILITIES AND SKILLS

1. Applies reading skills to content area reading.
2. Strengthens study skills through conscious and regular application.
3. Undertakes and carries through many independent reading and study projects.
4. Takes pleasure in extending vocabulary independently.

WORD RECOGNITION SKILLS

1. Applies all principles of syllabication previously learned.
2. Understands and uses primary and secondary accent.
3. Alphabetizes to the fifth and sixth letter and beyond.
4. Recognizes words formed by adding prefixes **con, ir, in, im, trans, inter, tele,** and suffixes **like, or, ary**.
5. Determines the accented and unaccented syllables with little or no help.
6. Recognizes various verb forms.
7. Extends knowledge of contractions and possessives.
8. Extends knowledge of compound and hyphenated words.

9. Uses transitional and qualifying words.

COMPREHENSION SKILLS

1. Is skillful at selecting the main idea.
2. Can skim to locate specific details.
3. Relates happenings in a story or steps in expository material in proper sequence.
4. Demonstrates increased competence in all previously learned comprehension skills.

INSTRUCTIONAL MATERIALS

Roads to Everywhere — Ginn

Ventures — Scott-Foresman

ENRICHMENT MATERIALS

Over the Bridge — Ryerson

Readers Digest Skill Builders — Revised Edition 4 1.

Chapter VI

MY PERSONAL EXPERIENCES IN SETTING UP A NONGRADED READING PROGRAM IN A SELF-CONTAINED CLASSROOM

Nature of the Project

Under the nongraded plan it is recognized that each child has his own pattern and rate of growth, and that children of the same chronological age vary greatly in their abilities and rates of growth. Basic differences in learning rates may be accommodated by providing longer time for a given block of work for slower learning students and reduced time for brighter students. The latter are encouraged within limits to move ahead regardless of grade level, or without fear of encroaching on the work of the next teacher. Continuous progress related to a pupil's ability eliminates undue pressure and produces a relaxed learning environment conducive to good mental health. Evaluation of growth is continuous, eliminating the year-end days of decision. The steady growth keeps the slow maturing student from becoming frustrated, and continuously challenges the talented ones, thus eliminating many behaviour problems. No single standard of achievement can be set up for all pupils.

The main reason for implementing my proposal is to maximize the opportunity for each child to learn to read. Because our children all have individual differences, no single method of reading instruction is sufficient for a well-rounded program. A combination of methods, with varying emphasis is needed. The reading program must provide a level of enrichment for the rapid learners, an organized program for slow learners, and opportunities to place and move children in learning situations where the most satisfaction is achieved.

Since the school where I am teaching is not following the nongraded plan, I have implemented within my own classroom a program of continuous progress in reading. I received consent from my principal and supervisor to do this. Under this continuous progress plan, I am able to provide an organizational framework that permits a flexible situation in the reading program for all children within my Grade IV class. These pupils are placed in a situation where they are reading at their own level, with emphasis on provision for individual differences.

With this plan I was able to provide a program for slow learners which eliminated the drawback of continuous failure. Success is guaranteed to the child if he is diligent, for he is not asked to do that which is impossible for him to achieve. It enabled me to place and move children in learning situations where satisfaction and self-development come through continual progress and success. It was necessary, as time went on, to make some shifts of children from one group to another. All factors relating to the youngsters emotional, social, mental and physical development were taken into account. When it was decided to move a pupil, I spoke to the parents on the phone to make them aware of the change. Children were grouped so that there was a narrow range of reading abilities within that particular group.

This program provided a level of enrichment for the rapid learners. These pupils in any class are usually easily identified. They are socially and physically mature, well co-ordinated, and relatively free of emotional and psychological problems. They are usually healthy and often lend spark to a group, but they are not necessarily leaders. Often what brings these children quickly to the attention of the teacher is that they finish assignments more quickly than others. When we spot them we can do one of two things: offer them more assignments, or more difficult assignments than other children. Only the latter procedure is sound. Children capable of doing more advanced work, of learning more refined or more advanced skills are expected to do so. I made an effort to plan my lessons to require the children to make use of the techniques of making comparisons; of collecting data or materials; of organizing classifying, and sorting this data and material; of observing and listening; of criticizing and analyzing for good or bad points inherent in each situation; and of looking for assumptions.

In order to encourage the children to think for themselves, I attempted to use further techniques of self-analysis for the purpose of self-evaluation, so that each child would see where his area of strength or weakness was. I encouraged my pupils to use their imagination and to try to be creative not only with their hands but also with their minds. We worked together a great deal on summarizing and paraphrasing. Rapid learners, even in a grade four classroom, are capable of performing these techniques with very little assistance from the teacher.

In this nongraded or continuous progress program it is our aim to provide a desirable environment where all children are given countless opportunities to grow at their own rate in their individual way. We teach the reading program to all children—the bright, the average, and the slow learning.

Description and Overview of the Reading Program in my Classroom

During the later part of last term (1969), we administered the Ginn Reading Tests and the Metropolitan Achievement Tests. Using the combined results, I divided the class into four reading levels. The top group scored well above grade four level, with scores ranging from 5.5 to 7.5. I placed these pupils in the regular basic reader **Adventure Awaits.** They did very well in the comprehension and study skills, but I had to spend more time on phonetic analysis, and syllabication. During one reading period a week this group uses the **S. R. A. Reading Laboratory,** alternating this occasionally with research work. This group finished their basic reader early in February. They did practically all the exercises in the manual, all the self-help activities, and their workbooks. Besides the above, they did many of the enrichment activities. I administered the Ginn Reading Tests to these nine pupils. The scores ranged from 196 to 211, the perfect score being 212. A score of 193 or above is classified as superior, and all their scores fell within this range. These pupils did a great deal of outside reading and always had a library book at their seat which they picked up when they completed their assignments. Although these nine pupils were very different, they worked very well as a group. After they completed their basic readers, they began work in the **Reader's Digest Skill Builders, Grade Five Level.** They have completed a personal book review on a book from the Scott-Foresman Series; a book report, and a book summary. They all did a very good job on the above. They enjoyed doing this extra work and found it challenging.

In April I plan to introduce them to the Co-Basal Reader **Under Canadian Skies,** (Grade Five Level). They will continue with the Skill Builders and the S. R. A. Program. I plan to give them more research work. They will proceed at their own rate, and do much of the work on their own.

The second group included pupils scoring from 4.1 to 5.3. This group started in September in the co-basal reader **Happy Highways.** Four of the pupils were progressing more rapidly than the others; so at the end of two weeks I put them in the top group. The remaining pupils continued in this reader until the second week in November. This group was working at its own level for its grade. These pupils had difficulties in reading and following directions, in phonetic analysis, in structural analysis and syllabication. Their comprehension was quite good, so more attention was paid to the other skills. We took somewhat longer on each unit in the basic reader than the top group. This second group should finish their basic reader about the last of April or early in May. At that time Ginn Reading Tests will be administered. For the remainder of the term I plan on using the **Reader's Digest Skill Builders** and on having them do some research work, and a personal book review using the **Scott-Foresman Series.**

This group as well as the top group work with the **S. R. A. Reading Laboratory** at their own level once a week, alternating occasionally with other related reading activities. One pupil from this group was placed in the third group after about two months. She was having more difficulty than the others, and I found she would hurry through her work with the result that it had many errors. She appears to be much more comfortable in the third group and is overcoming her areas of weakness.

The teacher aids set up a reading table for these two groups. She borrowed books from the public library and the library at St. Francis Xavier University. We also borrowed some books from our own library at Morrison School. Besides this we asked pupils to bring books they had at home and wished to share with their classmates for a period of time. The student aide discussed some of the books with the pupils, and she encouraged them to read a variety of them. The top group in particular really enjoyed this and read several books each month. The second group also took more interest in these books as time went on.

The third Reading Group is made up of pupils who scored from 3.6 to 3.9 on their tests. They were reading slightly below grade level and were weak in nearly all the skills. They were extremely lax about reading and following instructions, with the result that they needed much individual assistance. For two days a week this third group would leave the class during the reading period and have a special class with the remedial reading assistant. She worked with them on many of the skills in which they were weak and also used the **Reader's Digest Skill Builders,** (Grade Three Level) On the three days I had them for reading, I used the supplementary readers **Up and Away** and **Under the Bridge,** choosing stories with follow-up exercises to give them practice in the skills in which they were weak.

Around the first week in December, I started them in their basic reader. They continued with the remedial reading assistant, and she worked on the reading skills suggested in the workbook. I am doing the stories, comprehension skill, word-meaning exercises, structural-analysis exercises, and the follow-ups in the self-help activities. They are working comfortably in their reader and should finish it in June. If not, the next teacher will continue where they left off.

In the middle of January, after the reading assistant and I had two meetings to discuss this group's progress, we decided on moving one of these pupils into the next group. Later in February we did the same with two more pupils. All three are doing very well in the second group and were eager to do some work at home which the second group had done previously. This group also did some S. R. A. reading in their color level and seemed to enjoy it even more than the two top groups. I also used the Structural Reading Tapes frequently with this group.

In the fourth group are the pupils who scored from 2.5 to 3.5 on the tests. This group leaves the class every day during reading period and are taught by a remedial reading teacher. She is responsible for their reading program for the year, and as yet, none of them have come back into my third group. However, I understand there is one pupil who will be ready in a couple of weeks. The remedial reading teacher feels the remainder should be with her for the rest of the term.

Problems Associated with Implementation at the Classroom Level

Arriving at an effective grouping arrangement was the most difficult problem facing me as I tried to implement a continuous progress program. Grouping on the basis of ability does not produce a homogeneous group because children's abilities to cope with different phases of the reading skills vary. Grouping arrangements should be continually evaluated, and the approach to them should be marked by an element of flexibility.

Lack of an adequate supply of supplementary materials created a problem in trying to plan the instructional experiences to accommodate the needs of different groups of students. I found the biggest problem was to find supplementary material for the third group at the beginning of the term, for they were reading below grade four level, and at that time we didn't have the grade three cobasal readers. Again, when I was ready to begin the grade five cobasal readers with the top group, another class was already using them. Our reading periods were at the same time, so we both could not use them. If we had another ten books the problem would have been solved. As it is, I have to fill in with other materials until that class is finished with the books. Preparation for the different groups meant more research work and evaluation on the teacher's part. Although this was more demanding, the results have been most satisfying.

Many parents were concerned at the beginning as to why their child was not reading in the same reader as another child. However, after the continuous progress program was explained to them, they accepted this willingly and were well satisfied with the program.

Defense of the Procedure

Next term I plan to follow much the same procedure in the reading program and extend it to include all the language arts program. Additional planning will be necessary to put this program into operation. As a defense of this program, we must first think of each of the pupils as individuals and teach them as such. Teaching in a continuous progress program is aimed at giving each child an opportunity to proceed at the speed most appropriate to him. Some pupils will require a longer period of time than others for achieving certain learnings and attaining certain developmental levels. We must provide intelligently for these pupil differences. Differing abilities, interests, and opportunities among children cause the range in certain specific attainments to surpass the range in general achievement. Individual children's achievement patterns differ markedly from learning area to learning area. This program gives the rapid learners the opportunity to go ahead with more advanced and challenging work instead of settling for the boredom of waiting for the slower achievers and doing repeated seatwork on skills they already know. The average pupils work at their own rate without having the strong competition of the rapid learners. Also, they do not have to wait for the slow learners. Within each group they are all on nearly the same level; so they work much more efficiently.

The slow learners have their own program and work at their own rate without the fear of failure. They do what they are capable of doing and no more. These pupils do not become so frustrated as they previously did. They do not have to compete with rapid or average learners.

Chapter VII

PROPOSED ENGLISH PROGRAM FOR A CONTINUOUS PROGRESS SECONDARY SCHOOL

RATIONALE

This guide attempts to structure content and to develop sequency in the fundamental skills in the English program offered at the junior and senior high school levels. The program developed herein might be adapted to any secondary school with a sufficient number of pupils to offer a comprehensive school program. It is sufficiently broad and flexible to accommodate the needs of all students and could prove particularly helpful to those schools which are attempting to implement a continuous progress philosophy of education.

The following factors were considered in the development of this program:

1) Needs of students.
2) Inadequacies in the structure and organization of the current English program.
3) The basic understandings, skills, and appreciations that are fundamental in a sound English program.
4) Required materials.

One of the tenets of a democratic philosophy of education is that all students are entitled to an education in accordance with their capacities. Educators must continue to seek better ways of accommodating individual differences. Education, to be successful, must take into account environmental influences on the physical, social and emotional development of the child and the background of experience that has helped to shape the intellectual growth of each individual. Obvious learning differences ascertained from an examination of Standardized Reading Achievement Scores on a normal distribution of students entering grade seven reveal the heavy task that faces the English teacher in our present educational system. In most cases he must attempt to cope with students of vastly different abilities, interests, aspirations, and achievements without the variety of materials and the flexible organizations needed to accommodate their diversity.

In recent years in the province of Nova Scotia attempts have been made to offer programs other than the University Preparatory. These programs were designed to provide a high school education for the non-university bound student. Though they represent an improvement over the one-track program, their organization is too rigid to provide realistic accommodation for the majority of students. Difficulties in transferring from the General Program and the Adjusted program to the University Preparatory Course are numerous and sometimes very complicated. Most students do not fit totally into any one program. Choice of subjects within each program is too limited. The result is that our present programs tend to isolate and categorize students in such a way that the full development of their potential is not realized.

An awareness of the weaknesses in the present organization of our school program leads us to believe that a change is necessary. Nowhere is the need for change more apparent than in the structure and organization of the English program. As the basic subject which deals with oral and written communication and with the understanding and appreciation of literature, English must occupy a prominent place in the instructional program. The momentous task of the English teacher has been well described in the following terms:

> Although English teachers . . . have a great privilege in their potential influence on youth, they also have a heavy responsibility. No advanced or effective work is possible in the school system or in the workaday world without the ability to read, write, speak, and spell. The school system requires this ability, employers demand it, and the child has a right to expect it.[1]

THE STRUCTURE OF THE CURRICULUM OUTLINE AND PROPOSED ORGANIZATION FOR ITS IMPLEMENTATION

This paper represents a serious attempt on the part of the authors to define the fundamentals of a sound English program for the secondary schools and to propose a system of organization to flexibly adapt this program to the needs and interests of the student body. For the purpose of this study the English program was divided into the following areas: reading, grammar, composition, and literature. In each area of the English program an effort was made to define fundamental objectives, the basic skills and understandings which logically follow from an analysis of these objectives, suggested teaching techniques and/or learning activities will be effective in reinforcing the basic understanding and skills, and a list of suggested resource materials which would be useful in reinforcing the basics at different levels of achievement.

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[1] **English, A Teaching Guide,** grades 7-9 Halifax: Curriculum Branch, Department of Education, 1957. p, 5

From this outline of the fundamentals of the English program, *course outlines*, *units*, and *lesson plans* can be developed easily on a sequential basis. Sequency can be achieved by having tht basic skills and understandings run spirally through the various courses in increasingly more complex forms and in relation to more complex materials. This procedure in no way contradicts the guidelines laid down in **The Program of Studies** of the Department of Education in Nova Scotia.

In order to provide for the wide range of achievement and ability which prevails among the student body in a consolidated junior-senior high school enrolling not less than 700 members, a major change in the organization of the English Department is needed. To enable such a school to implement a nongraded English program, the following type of organization is recommended:

1. A multi-phased program which will provide the flexibility needed to accommodate the vast range of individual differences that exist among students by offering a variety of courses, of which many are similar in nature but vary in level of difficulty. A knowledge of the achievement and ability of students in a typical consolidated high school leads one to believe that a program consisting of four phases is required. Students should be placed in a particular phase on the basis of a thorough analysis of their achievement on standardized achievement tests in language arts and on the basis of qualitative teacher assessment of their academic performance.

Phase One Courses are designed especially for students who are so deficient in the basic English skills that they need special attention in small classes. These students usually have limited potential for academic growth. It is recommended that in this phase great emphasis be put on the fundamental reading skills, and that all other areas of English be integrated into the reading program. The basic vocabulary and comprehension skills set forth in the curriculum outline which follows this section should receive a great deal of stress. The critical skills may have to be left for a higher phase.

Phase Two Courses are designed to provide remedial work for students of average or better ability who are deficient in the basic English skills. At this particular phase the program should be individualized on the basis of pupil achievement on standardized language arts tests. To make this possible, a great variety of resource materials written for different grade levels are needed. As in the case of courses offered in phase one, all other aspects of the English program should be integrated into the reading program.

Phase Three Courses are designed for students of average ability who have at least average achievement in the basic language arts skills. At this stage the students are ready for separate treatment of different areas of the English program. These students are capable of a fair degree of mastery of all the basic skills and understandings outlined in the curriculum guide.

Phase Four Courses are designed for students of superior academic ability and achievement who are capable of mastering all aspects of the English program at a high level. While the continued refinement of the basic reading skills is desirable, a heavy emphasis on writing and literature is recommended. These students are capable of a high degree of self direction and have a great variety of interests. These factors should be kept in mind in designing courses for them.

2. A timetable devised in rotating cycles of five weeks duration. Seven five-week cycles will constitute a full year's work. During any one cycle a student will concentrate mainly on one specific area of the English program so that he may do reading in one cycle, followed by composition in the next cycle, literature in the third, and so on. Some reinforcement of the basic skills taught in other areas is recommended in all cycles.

Table One presents a timetable which was devised for a specific junior high school containing approximately 800 students. This schedule illustrates how the cyclical system of timetabling operates. This timetable has been constructed with four teaching levels in mind. These levels are equivalent to the number of years students will spend in this particular junior high school. Four levels are represented since students enter this school from grade five. Level One represents the students' first year in the junior high. Level Two the second, Level Three the third, and Level Four the fourth. Level One has only three phases. All other levels have four phas-

SUGGESTED CYCLICAL TIME TABLE – English (Levels 1 - 4)

Teacher	Day One		Day Two		Day Three		Day Four		Day Five		Day Six	
	Level Phase Class No.	Level Phase Class No.	Level Phase Class No.	Level Phase Class No.	Level Phase Class No.	Level Phase Class No.	Level Phase Class No.	Level Phase Class No.	Level Phase Class No.	Level Phase Class No.	Level Phase Class No.	Level Phase Class No.
(Comp.) A	*4 - 4 - A	4 - 4 - B	4 - 4 - A	4 - 4 - B	4 - 4 - A	4 - 4 - B	4 - 4 - A	4 - 4 - B	4 - 4 - A	4 - 4 - B	4 - 4 - A	4 - 4 - B
	4 - 3 - C	4 - 3 - D	4 - 3 - C	4 - 3 - C	4 - 3 - C	4 - 3 - D	4 - 3 - C	4 - 3 - C	4 - 3 - C	4 - 3 - D	4 - 3 - C	4 - 3 - C
(Lit.) B	4 - 2 - E	4 - 2 - F	4 - 2 - E	4 - 2 - F	4 - 2 - F	4 - 2 - F	4 - 2 - E	4 - 2 - F	4 - 2 - E	4 - 2 - F	4 - 2 - E	4 - 2 - F
	4 - 1 - G	4 - 1 - 4	4 - 1 - G	4 - 1 - G	4 - 1 - G	4 - 1 - H	4 - 1 - G	4 - 1 - G	4 - 1 - G	4 - 1 - H	4 - 1 - G	4 - 1 - G
(Grammar) C	3 - 4 - A	3 - 4 - B	3 - 4 - A	3 - 4 - B	3 - 4 - A	3 - 4 - B	3 - 4 - A	3 - 4 - B	3 - 4 - A	3 - 4 - B	3 - 4 - A	3 - 4 - B
	3 - 3 - C	3 - 3 - D	3 - 3 - C	3 - 3 - C	3 - 3 - C	3 - 3 - D	3 - 3 - C	3 - 3 - C	3 - 3 - C	3 - 3 - D	3 - 3 - C	3 - 3 - C
(Lit.) D	3 - 2 - E	3 - 2 - F	3 - 2 - E	3 - 2 - F	3 - 2 - E	3 - 2 - F	3 - 2 - E	3 - 2 - F	3 - 2 - E	3 - 2 - F	3 - 2 - E	3 - 2 - F
	3 - 1 - G	3 - 1 - H	3 - 1 - G	3 - 1 - G	3 - 1 - G	3 - 1 - H	3 - 1 - G	3 - 1 - G	3 - 1 - G	3 - 1 - H	3 - 1 - G	3 - 1 - G
(Reading Skills) E	2 - 4 - A	2 - 3 - B	2 - 4 - A	2 - 3 - B	2 - 4 - A	2 - 3 - B	2 - 4 - A	2 - 3 - B	2 - 4 - A	2 - 3 - B	2 - 4 - A	2 - 3 - B
	2 - 3 - C	2 - 2 - D	2 - 3 - C	2 - 3 - C	2 - 3 - C	2 - 2 - D	2 - 3 - C	2 - 3 - C	2 - 3 - C	2 - 2 - D	2 - 3 - C	2 - 3 - C
(Grammar) F	2 - 2 - E	2 - 1 - F	2 - 2 - E	2 - 1 - F	2 - 2 - E	2 - 1 - F	2 - 2 - E	2 - 1 - F	2 - 2 - E	2 - 1 - F	2 - 2 - E	2 - 1 - F
	2 - 1 - G	2 - 1 - G	2 - 1 - F	2 - 1 - G	2 - 1 - G	2 - 1 - G	2 - 1 - F	2 - 1 - G	2 - 1 - G	2 - 1 - G	2 - 1 - F	2 - 1 - G
(Lit.) G	3 - 3 - D	3 - 1 - H	3 - 3 - D	3 - 1 - H	3 - 3 - D	3 - 1 - H	3 - 3 - D	3 - 1 - H	3 - 3 - D	3 - 1 - H	3 - 3 - D	3 - 1 - H
	4 - 3 - D	4 - 1 - H	4 - 3 - D	4 - 1 - H	4 - 3 - D	4 - 1 - H	4 - 3 - D	4 - 1 - H	4 - 3 - D	4 - 1 - H	4 - 3 - D	4 - 1 - H
(Reading Skills) H	2 - 2 - D	2 - 2 - E	2 - 2 - D		2 - 2 - D	2 - 2 - D	2 - 2 - D		2 - 2 - D	2 - 2 - E	2 - 2 - D	
(Integrated Course) I	1 - 4 - A	1 - 3 - B	1 - 4 - A	1 - 3 - B	1 - 4 - A	1 - 3 - B	1 - 4 - A	1 - 3 - B	1 - 4 - A	1 - 3 - B	1 - 4 - A	1 - 3 - B
	1 - 2 - C	1 - 2 - C	1 - 3 - B	1 - 2 - C	1 - 2 - C	1 - 2 - C	1 - 3 - B	1 - 2 - C	1 - 2 - C	1 - 2 - C	1 - 3 - B	1 - 2 - C

* 4 - 4 - A   Level 4, Phase 4, Class A

es. The courses will be labelled accordingly so that it will be readily understood that Reading I is followed by Reading II; Literature III is followed by Literature IV, and so on. This timetable is prepared for an English Department which will have nine teachers, one of whom will be department head, and a student body of eight hundred who wil be divided into twenty-six classes. The seven teachers labelled A to G will rotate every five week for the full seven cycles and thereby will teach the same area of English to all the students in the school. H and I will remain stationary.

Students will be permitted to progress as rapidly as possible in any area of work. The curriculum and the timetable will facilitate easy movement from one phase to another. This should make the appropriate placement of each pupil a reality.

ENGLISH CURRICULUM OUTLINE — GRADES 7 — 12

READING*

OBJECTIVE I — TO DEVELOP EFFECTIVE HABITS OF WORD RECOGNITION.

SKILLS

A. AUDITORY DISCRIMINATION

1. RECOGNIZE LIKENESS AND DIFFERENCES IN SOUND OF WORDS.

1.
- Pronounce three words, two of which are the same — **run, jump, run.** Have students tell which word is the same as the first and which word is different. Gradually increase the difficulty of this work by choosing words that are very similar in sound — **lame, tame, same.**
- Say words which begin with the same sound — **Tom, top, table,** and ask students to add other words which begin with the same sound. In the same manner, introduce words with the same end sound — **top, mop,** etc., and have students suggest other words that have the same ending. Later, try words that have the same sound repeated in the middle of the word — **flatter, chatter,** etc., and encourage students to repeat other words wih the same middle sound.
- Use simple poetry as a means of introducing rhyming words. Have students repeat the words that sound alike, and have them suggest other rhyming words that could be used.
- Records and tapes could be very effectively used in these exercises in auditory discrimination.

2. RECOGNIZE THE NUMBER OF SYLLABLES IN A WORD.

2. Begin with familiar one-syllable words — perhaps the

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*Objectives and component skills are in large, bold print. The corresponding teaching techniques or learning experiences follow in regular print.

names of students in the class — and gradually build up to two, three, and multi-syllable words. Ask students to listen closely to the number of sounds they hear. Tapping the desk with a pencil or clapping hands could reinforce the sounds heard.

3. IDENTIFY THE ACCENTED SYLLABLE.

3. Have students repeat two or three syllable words and listen to the syllables — e.g. : **button.** Then ask a student to use the word in a sentence while the other students listen for the sound of the syllables in the word being used. Do the syllables sound the same? Have students choose the one which has the loudest sound. Repeat this exercise with other words, perhaps using some in their reading selection. Gradually increase the difficulty of the words being used.

4. APPRECIATE THE SOUNDS OF WORDS AND WORD COMBINATIONS.

4. Ask students to describe sounds, e.g. : sounds made by various animals and machines; a train whistling and whining; the growling of a big black bear; the squeaking of a tiny, timid mouse (pictures could be used). Have students find repetitions of sounds in their reading selections. Why do writers use this repetition? Can you suggest others?

5. BECOME FAMILIAR WITH HOMOGRAPHS.

5. Choose words from reading selections and ask for other meanings the words can have apart from the meaning in the selection. Does the pronunciation of the word remain the same? Use such words as: **produce, progress, conduct, tear, wound, excuse, present,** and **permit.**

6. IDENTIFY WORDS WITH SLIGHT VARIATIONS IN PRONUNCIATION.

6. List on the blackboard pairs of words which are very similar in pronunciation, such as: **lose, loose; raised, raced; pitcher, picture; guest, guessed.** Have students indicate the one which is pronounced.

B. VISUAL DISCRIMINATION

1. RECOGNIZE AN INCREASING NUMBER OF WORDS BY SIGHT, THROUGH EXTENSIVE READING, BOTH INDEPENDENT AND DIRECTED.

1. Encourage students to make lists of new words they encounter in their reading. Flash cards can be used to check pronunciation and understanding of these words.

2. INCREASE SPEED OF VISUAL WORD IDENTIFICATION.

2. Use flash cards or T. scope to develop speed in word recognition. Gradually increase the speed at which the words are flashed. Noticeable improvement in speed should be expected from students on an individual basis. Students could work in pairs to increase their speed.

3. RECOGNIZE FAMILIAR PARTS WITHIN A WORD RAPIDLY.

3. Have students skim lists of words to find those words which contain a given root word. e.g. Root word — plan — **planning, preplanning, plain, plait, planner, plot, planned.**

4. DISCRIMINATE BETWEEN WORDS OF SIMILAR SPELLING.

4. Prepare exercises in which the student is to choose one of two words that are similar in spelling to use in a given sentence. e.g. in the room. **(quite, quiet)**

C. PHONETIC ANALYSIS

1. KNOW VARIANT VOWEL PRONUNCIATION.

1. **a and b.** Prepare a list of words containing short vowel sounds. Example: **bat, pen, hit, of, cut.** Have students underline the vowels. Discuss the sound of the vowel in each word and have them determine where it is located.

a. SHORT VOWELS

- In the same manner have students locate and sound the vowels in a list of words, such as **tape, be, hi, so, cute.**

b. LONG VOWELS

- Have students generalize concerning the sound of a single vowel when it is at the beginning or in the middle of a word (usually short), and when it comes at the end of a word. ually long). What happens to the sound of **e** when it comes at the end of a word?

- Assign exercises requiring students to underline or circle vowel letters that stand for a long (or short) vowel sound. Nonsense words can be used in the list.

c. DIPTHONGS

c. Have Students pronounce a list of words containing **oi** and **oy.** e.g. : **toil, toy, soil soy, boy, boil.** What sound does **oy** replace the **oi** at the end of a word?

- Have pupils study another list of words containing **ou** and **ow.** e.g. : **found, town, clown, sound, round, cow.** Lead to generalization that **ou** and **ow** have the same vowel sound. Have students suggest other words which contain this sound. Present new words containing this sound and have each word pronounced.

d. EFFECTS OF R

d. Present a list of words containing vowels followed by **r.** Example: **bar, park, far, fir, war, army, garbage, cord, born, world, worm.** Lead students to generalize that if **r** follows a vowel, the vowel sound is generally not short, but an r-controlled sound.

e. SCHWA SOUND

e. List on blackboard known words, e.g. **above, barrel, marble, minus, table, satin, pilot.** Have students pronounce the words listening closely for the vowel sounds. Develop through questioning the understanding that sometimes a vowel can have a special sound, which is neither the long or the short vowel sound. Through exercises they should also discover that the **schwa** sound usually appears in an unaccented syllable, and that le is often a clue to this sound.

2. KNOW THE SOUNDS OF SINGLE CONSONANTS AND CONSONANT COMBINATIONS:

a. BLENDS

a. Have students pronounce words such as **glad, smoke, plate, strawberry, shrink.** Have them notice the sounds of the consonants **gl, sm, pl, str, shr**—a blend of two or more consonants without an intervening vowel sound. Have students suggest other words which contain consonant blends. Have them complete words in sentences by adding the proper consonant blend. e.g.: **spr, thr, spl, sm, shr, str.**

1. The ———ing was knotted.
2. The dress had ——— unk.
3. ——— ing will soon be here.

b. DIAGRAPHS

b. Write on board a list of words containing consonant digraphs (**ch**ore, bu**sh**el, ceil**ing, wh**eat,**ch**ief).As these words are pronounced have students listen for sound produced by the underlined consonants—a new sound which is not like the sound of either consonant. Prepared lists of words can be used for identifying digraphs.

c. HARD AND SOFT c AND g.

c. Have students repeat words containing the letter **c.** Lead them to realize that sometimes **c** can stand for the **s** sound at other times it stands for **k.** Through pronunciation of other words, they should note that **c** followed by **o** or **a** usually has the **k** sound, and that **c** followed by **e** or **i,** usually produced the **s** sound.

- In the same manner, introduce the two sounds of **g:** the **g** as in **g**un and the **g** sound as in **g**em. Have students determine the sound of **g** in lists of words, such as, **germs, Egypt, tiger, magazine.**

d. SILENT LETTERS

d. Have students note the difference in pronunciation of pairs of words, such as, **hat; hate; cap; cape; Tim; time; tub;**

tube, rob, robe. Lead them to generalize that the silent **e** at at the end of a word generally produces a long vowel sound within a word.

- Ask students to suggest words containing various double or triple consonants, such as **r** and **n** together, or **m** and **b,** or **gh** and **t.** Which letter usually remains silent?

- Present words containing consonant twins **(ll, dd.)** as in **still middle, basketball.** Have students notice that consonant twins usually spell just one sound; the second twin is usually silent.

3. RECOGNIZE OPEN AND CLOSED VOWELS.

- List on the board words such as **table, fever, silence, over, duty.** Have these words broken into syllables. The first syllable in each word is an "open syllable." How does it end? With a vowel or a consonant? Is it long or short? Ask students to pronounce a list of words **(siren, vacant, favor, gravy, climate)** and then write them in syllables. They then should be able to complete a statement of the idea: When only one consonant letter comes between two vowels the letter usually begins the second syllable.

- Next present words which contain double consonants between two vowels. Have students pronounce the word: **public, goblin, rescue, tractor.** They then should be able to see that closed syllables are those which end with a consonant. The vowel in a closed syllable is usually short.

4. Application of preceding skills to spelling as well as word recognition.

4. As students meet new vocabulary in all assignments, have them apply their understanding of the structure of words to the pronunciation of new words. By repeated reference to certain basic understandings which they have mastered, retention will be enhanced and they will see the value of their previous work.

D. STRUCTURAL ANALYSIS:

1. ARRANGE WORDS IN ALPHABETICAL ORDER.

1. Though this skill can also be listed as a dictionary skill, students examining the structure of a word should have this step mastered. Begin with simple familiar words listed on blackboard and have students rewrite lists in alphabetical order. This should lead into prepared exercises found in workbooks, such as **Phonics Skilltext.**

2. RECOGNIZE COMMON INFLECTIONAL ENDINGS. (S, ES, ED, ING)

2. Write simple sentences using familiar verbs, such as, **walk, read, play,** on blackboard. Through discussion have students understand meaning of sentence in regard to tense. Change tense of verb in sentences. Have students note root word and endings and note change in meaning in regard to tense. Allow students to make generalizations of changes that have taken place in spelling of words. Students should be made aware of these inflectional changes as they appear in reading lessons, as well.

3. RECOGNIZE INFLECTIONAL CHANGES IN ROOT WORD.

3. Introduce this skill with familiar words. i.e. take a word like **mouse** and get the students to give the form that means more than one (plural). Have them note how the change in meaning causes the change in spelling. (structure of word). Have exercises prepared for practice. In the early development of this skill, every time such words appear in reading, they should be brought to attention of students.

4. KNOW THE RULES PERTAINING TO NOUNS ENDING IN Y WHEN PLURALS ARE REQUIRED.

4. These rules can be demonstrated by using familiar words which employ these rules. e.g. write on board words like **monkey, lady, key, baby, valley** and have students write the plural forms of these words. Have them note the words that required **s** to make the plural form and those where the **y**

was changed to **i,** before adding **es.** Elicit generalization from students:

(a) when **y** is preceded by a vowel, to form the plural, simply add **s.**

(b) When **y** is preceded by a consonant to form the plural, change the **y** to **i** and add **es.**

Reinforce with workbook exercises or exercises prepared by teacher. Note these words in reading lessons.

5. KNOW THAT WHEN WORDS END IN SILENT E, THE E IS DROPPED BEFORE ADDING ING.

5. Write lists of words **take, bake, ride,** etc., on board Have students develop sentences to use these words. Then adding ing towords. Have students point out changes in structure. Develop further sentences using new forms of words. Allow students to make the generalization as to what change has taken place. Reinforce with further exercises.

6. KNOW THAT ONE SYLLABLE WORDS OR WORDS OF MORE THAN ONE SYLLABLE THAT END IN A CONSONANT DOUBLE THE FINAL CONSONANT BEFORE ADDING ING.

6. This skill should be introduced using familiar words such as **get, hit, run, begin.** Use these words in sentences. Discuss meaning of sentences. Then have students give sentences using the **ing** forms of verbs. Have students pay particular attention to change in spelling and allow them to give generalization.

7. IDENTIFY SYLLABLES OF SIMPLE WORDS.

7. Skill in recognition of syllables of simple words should be mastered before proceeding to more difficult words. List familiar words (**fruit, organ, beauty**) on board and have students repeat them aloud to hear the different parts. Have students become aware of what a syllable is and how division of words into syllables aids in pronunciation of words. Students should note that every syllable must contain a vowel sound.

8. LOCATE SYLLABLES IN WORDS WHERE THE VOWEL IS FOLLOWED BY A SINGLE CONSONANT.

8. List common words such as **maker, piper, rumor, paper** on board. Have students pronounce each word, then divide word into syllables. Have students generalize that when a vowel is followed by a single consonant, the syllable division usually occurs between the vowel and consonant. Also have students become aware that the vowel in the first syllable is long.

9. KNOW THERE IS A SYLLABLE DIVISION BETWEEN A DOUBLE CONSONANT.

9. On board list common words, some containing double consonants and others with only one consonant between vowels. **(button, money, blotter).** Have students break words into syllables and allow students to make the generalization: When a double consonant comes between two vowels, a syllabic division usually occurs.

10. RECOGNIZE SYLLABLE DIVISION IN WORDS ENDING IN ED.

10. List on board common verbs such as **headed, mended, parted, rented.** Have students circle root word. With what letters do the root words end? (d, t) Arrange second list of verbs on board—**played, warmed, picked.** Allow students to pronounce these words and listen for sounds. Have students circle root words. Refer to first list again. Pronounce words. Have students discover that when **t** or **d** comes before ed, the **ed** is a separate syllable.

11. RECOGNIZE SYLLABLE DIVISION IN WORDS ENDING IN le.

11. List on board words such as **bottle, riddle, sample, bundle.** Have students pronounce words and divide words into syllables. Allow students to discover that the consonant coming before **le** plus **le** make up the final syllable.

12. DETERMINE WHETHER VOWELS ARE LONG OR SHORT.

12. List on board several one syllable words like **mat, rat, fat, pan.** Get students to pronounce them. Then add **e** to each one of the words. Have students pronounce these words. Allow them to discover the differences in sound. Elicit generalization from students. In a one-syllable word ending in a consonant the vowel is short, while in one-syllable words ending in **e** the first vowel is long and the final **e** is silent.

13. RECOGNIZE PRIMARY AND SECONDARY ACCENTS.

13. Students should discover that syllables are pronounced with varying degrees of loudness. List on board words such as **pencil, summer, hammer, silver.** Have students pronounce each aloud and listen carefully while pronouncing each word. Lead students to note syllable that bears more stress. Introduce the words **Primary and Secondary Accents.** Make sure students understand meanings of each. Refer to dictionary respellings. Reinforce skill with prepared exercises. This skill should also be reinforced in reading lessons, especially when students have difficulty with pronunciation of words.

14. IDENTIFY AND UNDERSTAND MEANING OF PREFIXES AND RECOGNIZE SUCH AS SEPARATE SYLLABLES.

14. On blackboard have several different lists of words, each list containing words with common prefixes, such as:

return
rewind
recall

untie
undo
unnecessary

discourage
discontinue
disregard

Have students pronounce and divide words into syllables. Elicit generalization that when a word contains a prefix, the root word is generally stressed. Discussion of meanings of prefixes should lead students to realize purpose of prefixes.

15. IDENTIFY AND UNDERSTAND MEANINGS OF SUFFIXES AND RECOGNIZE SUCH AS SEPARATE SYLLABLES.

15. Activities similar to activities on prefixes should be develop- with the objectives of the function of prefixes kept in mind.

16. RECOGNIZE COMPOUND WORDS.

16. Sentences containing simple compound words should be written on the blackboard:

    1. The milkman came to our house this morning.
    2. Father always reads the newspaper.
    3. My brother received a new flashlight for his birthday, etc.

    Have students pick out the words in each sentence that is made up of two smaller words. Introduce the term **compound word.** Elicit meaning of compound from students. Practice to distinguish aurally and visually the two roots of a compound word should be given.

17. KNOWN COMMON CONTRACTIONS.

17. On blackboard write sentences such as:

    1. I haven't a pencil and Joan hasn't any pens.
    2. John isn't going but we've planned to go.

    Have students note apostrophes used in the words **haven't hasn't, we've, isn't.** What do apostrophes indicate? What letters have been omitted? Write out different words with corresponding contractions. Ample practice should be given so that students are able to recognize and comprehend contractions and differentiate them from possessive forms in all their reading.

18. IDENTIFY DERIVED FORMS OF WORDS.

18. Use words like **harder, hardest, happier, happiest, happily, angrier, angriest, angrily** in sentences written on board. Have students name root words. Elicit from students generalization as to use of different forms as demonstrated in sentences. Allow them to discover change in spelling that occurs with change in use. Note in particular changes that occurs in words whose roots end in **y.** Further exercises should be presented to reinforce this skill.

OBJECTIVE II — TO DEVELOP SKILL IN INCREASING VOCABULARY

SKILLS

1. DEVELOP LISTENING AND SPEAKING VOCABULARY.

1. Students should be taught to be constantly alert for recognition and understanding of new words. This skill should be developed in all reading lessons and in all subjects. New words should be pronounced and meaning in context and other variances of meaning should be developed. Exercises dealing with common words and meanings of each in different sentences to reinforce this skill should be prepared and completed by students.

Run	The boy hit a home **run.** There is a **run** in Mary's stocking.
Ring	Did you hear the bell **ring?** Joan received a new **ring** for her birthday.

2. INCORPORATE PRECISE TERMS INTO VOCABULARY.

2. Develop in students the habit of using correct terms in speaking and writing. Instead of accepting words like "stuff" encourage students to use exact term.

3. UNDERSTAND WORD DENOTATION AND CONNOTATION.

3. This skill probably can be best developed in early stages through oral discussion leading to a written exercise. e.g.

   What does winter mean to a person living in Florida?

   What does winter mean to a person living in Alaska?

   This should lead students to discover that when a writer chooses an exact word (denotation) to express himself, there is very little opportunity for individual interpretation, whereas when he uses broad or general terms, (connotation) there is much opportunity for general inferences. As students proceed in reading they should soon be able to generalize that when words of limited meaning are used in reading and writing, the material is very clear cut and meaning is very obvious.

4. USE PICTURES AND CONTEXT CLUES TO ARRIVE AT WORD MEANING.

4. When introducing a new reading lesson, pictures and context clues should be used to have students discover vocabulary related to the selection. Those words should be written on the blackboard with emphasis placed on syllabication, pronunciation and meaning.

5. UNDERSTAND NEW WORDS THROUGH KNOWN PARTS.

5. Skill in examining a word to obtain root word and prefixes should be continuously reinforced. Ex: A student knowing the meaning of the root **port** and the meaning of common prefixes and suffixes, with the aid of context clues, should be able to discover the meanings of **import, export, deport, report, portage, porter, transport, etc.**

6. UNDERSTAND SYNONYMS AND ANTONYMS.

6. Students should be led to discover how one word fits better into a sentence and gives a better picture than another. This could be introduced as words are met in reading material. Then formal exercises in selection of correct synonym and antonym to be used could be presented.

7. INCREASE AWARENESS OF INFLUENCE OF MASS MEDIA AND TECHNICAL VOCABULARIES.

7. Have students become aware of influence of mass media and technical vocabularies by: 1) Listening and watching special radio and T. V. programs. Recording new words and bringing them to class. Through discussion students should be led to discover the meaning and function of each word. 2) Having students list words peculiar to certain hobbies. Note the importance of these words if one is to express himself clearly, while describing any one of the hobbies.

8. DEVELOP AN UNDERSTANDING OF COLLOQUIALISM AND SLANG.

8. Colloquial and slang expressions should be noted when stu-

dents use such expressions either in oral discussion or written work, as well as when such expressions are encountered inreading.

Emphasis should be directed toward the meaning of expression and the function it serves. Students should be encouraged to use more formal expressions instead of slang, especially in written exercises.

9. UNDERSTAND AND INTERPRET FIGURATIVE LANGUAGE.

9. Skill should be developed in students to distinguish between literal and figurative language through practice in simple sentences, such as:

    1) The wind whispered among the bushes.
    2) The wind blew among the bushes.
    1) The trees were dressed in robes of scarlet, bronze and sable.
    2) The colors of the leaves are red, yellow and brown.

    Students should become aware of the importance of descriptive language and imagery. They should also be led to discover that a common word used in an unusual manner becomes a very apt descriptive word.

10. INCREASE AWARENESS OF CONTRIBUTIONS OF OTHER LANGUAGES TO THE ENGLISH LANGUAGE.

10. As common words such as **salt, type, factory, television, theater** are met in reading, students should be motivated to find out the origin of the word and its original meaning. A chart of these words might be compiled as a class project.

11. BE COGNIZANT OF NEW WORDS BEING ADDED TO THE ENGLISH LANGUAGE.

11. This skill can easily be co-ordinated with Skill No. 10. A large chart containing new words such as **Sputnik, radar,** etc., with meanings could also be constructed as a class project. Since some of these new words will not appear in older dictionaries, students should obtain meanings from the context of a sentence, as well as from the structure of the word.

12. INCREASE DICTIONARY SKILLS.

12. Students should be encouraged to have their dictionaries and make constant use of them. (Glossaries also.) Prepared exercises to develop skill in location of words, etc., should be also given to students often, so that they will become efficient in the use of the dictionary.

OBJECTIVE III — TO DEVELOP COMPREHENSION SKILLS

1. IDENTIFY MAIN IDEA.

1. Develop skill in identifying main idea of paragraphs by having students read short paragraphs, orally, at first, followed by discussion of what the paragraph is about. This should lead into the next step where students silently read short paragraphs and write out the main idea. To vary assignments, students should be given exercises containing a multiple choice of ideas. Discussion leading to the selection of the correct idea should be arranged. Students should be led to reason why the selected idea is correct.

2. DEVELOP SKILL IN ABILITY TO USE TITLES AND HEADINGS AS CLUES TO SELECT MAIN IDEA.

2. In all lessons students can be directed to convert headings and titles into questions by using the questioning words: **Who, Which, Why, When, How, What?** Soon they will discover that these questions will direct them to the main thought of the paragraph.

3. READ FOR DETAILS.

3. Through oral questioning the teacher leads students to find answers for direct questions by reading an appropriate selection. When students have become adept at this procedure, they can write and answer or complete exercises that develop the skill of reading for detail. Students should be directed to distinguish more important details from less important ones. This is important, for it prepares the students to develop the skill of outlining. Charts such as the following one are helpful in developing a visual image of

the main idea and supporting details with the students.

MAIN IDEA

DETAIL DETAIL DETAIL

4. RECOGNIZE SEQUENTIAL ORDER.

4. To develop this skill, paragraphs that describe events in chronological order are necessary. Teacher can have students write events in sequential order or else present exercises to students which require them to re-arrange events in proper sequence. Students should be taught to note the importance of signal words such as **first, next, then, finally,** etc.

5. READ FOR CAUSE AND EFFECT RELATIONSHIPS.

5. At first present simple paragraphs where one event leads to another. e.g. Yesterday Mother did not want me to play outside in the rain. I disobeyed her. Today I could not go to school because I was sick and I missed my class party. In discussion students can be led to discover how one event caused others to happen. Gradually, students should be introduced to paragraphs of a more difficult nature.

6. UNDERSTAND THE EFFECT OF PUNCTUATION ON MEANING.

6. Exercises where punctuation plays a major emphasis can be completed by students. Punctuation can be arranged so that students discover how a change in punctuation brings about a change in meaning.

7. UNRAVEL COMPLICATED SENTENCES.

7. Direct students to look for the core of a sentence when confronted with a long, complicated sentence or sentences. Find the verb first. Next, by asking the questions Who? or What? with the verb, find the subject. Then put subject and verb together with questions What? or Whom? to find the object. Students should become aware that when the core of the sentence is found, the remainder of the sentence becomes easier to understand.

OBJECTIVE IV — TO DEVELOP SKILL IN CRITICAL AND INTERPRETATIVE READING.

1. DIFFERENTIATE FACT FROM OPINION.

1. Present paragraphs containing facts and opinions for discussion. Have students select factual statements. Elicit from them the means by which these statements could be proven. When students understand thoroughly what factual statements are, discuss opinions. Elicit from students the differences between facts and opinions.

2. EVALUATE THE RELIABILITY OF CONTENT.

2. Have students study advertisements from several sources—magazines, newspapers, radio, or T. V. Lead them into discussion re the qualifications of person who is speaking in the ad. Ex: A doctor would speak with more authority on a topic related to one's health than a bricklayer. This discussion could lead into examination of textbooks, encyclopedias, magazines. Note date of publication, reputation of authors and publishing companies. Note whether or not information is presented in a biased form.

3. MAKE COMPARISONS.

3. Have students examine pictures to judge the relative size of items illustrated. Ask students to list items from smallest to largest or vice versa. Present sentences that have many details and sentences with few. Note key words which are used in setences that give more information and a mental picture of author's message. To develop skill in forming mental images, pictures can be matched with descriptive phrases.

4. DRAW CONCLUSIONS.

4. Have students complete exercises after reading lesson where they would have to list details to prove a statements. e.g. Prove that Brother Fox was very sly. Students should be led to understand that authors do not always state these facts openly but merely lead us to draw our conclusions from what the characters say or how they act.

5. MAKE INFERENCES.

5. Have students read paragraphs and then answer questions such as: 1) What kind of weather do they have in country X? How do you know? In what kind of home do these people live? Why? After completing several exercises of this nature, students should be led to understand that authors often make statements and allow readers to supply details. (This is a different skill from drawing conclusions. In drawing conclusions, details are supplied which lead to conclusions. In inferences we have to visualize details from general statements.)

6. ANTICIPATE EVENTS.

6. Direct students to read simple stories and before they finish reading, have them predict or guess what is going to happen next or how the story will end. At the end of reading, allow time to discuss what really did happen and compare with students' predictions. Continued practice should promote growth in this skill.

7. UNDERSTAND AUTHOR'S POINT OF VIEW.

7. Editorials on a particular subject from different newspapers are useful in developing this skill, especially if editors have different political tendencies. American and British history books can also be used to reinforce this skill. eg. an article concerning the American Revolution written by an American and the same article written by a British historian might have a conflicting point of view.

8. DETECT PROPAGANDA.

8. Distribute a news item on the same event from at least two different newspapers. One should be a highly emotional report of an event while the other should be very factual. Have students note and explain the differences in the reporting of this item. Have students note the words or ideas used in the highly emotional report and have them point out the differences in the two reports. Finally elicit from students the generalization that some articles use emotional words or ideas to influence judgment or opinion and this technique may be classified as propaganda.

9. RECOGNIZE EXAGGERATION, PERSUASION AND ERRORS IN REASONING.

9. Through discussion lead students to realize that exaggerations are often used orally and in writing to add interest or to emphasize a statement. In fiction this exaggeration adds color, while in advertising or factual reporting exaggeration can be misleading.

- Advertisements from mass media can be used effectively to illustrate the art of persuasion. Students should be led to realize that the author is really trying to influence his readers by appealing to emotions.
- Errors in reasoning can be pointed out when they appear in reading lessons by having students explain how wrong conclusions are reached and why they are wrong.

10. APPLY IMPLICATIONS TO REAL LIFE.

10. At the end of story ask questions such as: 1) What would you have done, if you had been in the chief character's place? 2) Why? 3) Have you ever known anyone like a particular character in the story? 4) How do you feel about him or her? Lead students to realize that from studying characters and observing the influence of their environment on them, we can become more aware of ourselves and the people with whom we come into contact.

OBJECTIVE V — TO DEVELOP STUDY AND LISTENING SKILLS SKILLS

1. UTILIZING GRAPHIC MATERIALS.

Suggested Student Activities and Teaching Techniques

1. a. Use pictures
   b. Interpret maps
   c. Use graphs and tables
   d. Interpret cartoons

2. USING BOOKS.

2. a. Make intelligent use of
    1. Title, copyright
    2. Table of contents
    3. Index
    4. Glossary
    5. Appendix
    6. Chapter headings
    7. Introductions
    8. Summaries

3. USING REFERENCE MATERIALS.

3. a. Make use of
    1. Card catalogue
    2. Alphabetical order
    3. Dictionary
    4. Encyclopedia

4. ORGANIZING MATERIAL.

4. a. Select and evaluate material
   b. Take notes
   c. Make outlines
   d. Make summaries
   e. Write a precis

5. FOLLOWING ORAL AND WRITTEN DIRECTIONS.

5. a. Follow simple directions
   b. Follow complex directions

6. REVISING AND IMPROVING WORK.

6. a. Proofread
   b. Rewrite

7. IMPROVING LISTENING SKILLS.

7. a. Maintain attention
   b. Comprehend what is heard
   c. Use critical judgment in evaluating what is heard
   d. Increase ability to retain what is heard
   e. Be a courteous listener.

Much use should be made of audio-visual material such as charts, diagrams, films, filmstrips, and records to introduce and to reinforce these basic skills. In all cases an individual diagnosis of weaknesses and strengths should be made and corrective work should be prescribed. The effective reinforcement of these skills requires their correlation with other subject areas.

GRAMMAR

OBJECTIVES

1. TO DEVELOP AN UNDERSTANDING OF

(a) What is meant by a grammatically complete sentence.

(b) The structure of a sentence.

(c) Sentences according to function.

(d) Sentences according to structure.

Skills and Understandings*

1. a. Be able to recognize and write grammatically complete sentences.
   b. Locate subjects and predicates in sentences in natural, inverted and split order.
   c Add modifiers as a means of expanding sentences and giving more detail.

d. Understand kinds of sentences grouped according to function to develop ability to express ideas exactly.

e. Understand kinds of sentences grouped according to structure to develop ability to express ideas and see ideas and relationship between ideas with greater ease and facility.

f. Recognize the most commonly used co-ordinating conjunctions and sub-ordinating conjunctions.

2. TO DEVELOP AN UNDERSTANDING OF THE FUNCTION OF NOUNS AND TO BE ABLE TO DISTINGUISH AMONG THE CLASSES OF NOUNS.

2. a. Understand the principle by which students can determine whether nouns are proper, common, or collective.

b. Understand the need for capitalization when writing proper nouns.

c. Be able to write and read abbreviations.

d. Understand the qualities of nouns (gender, number) that affect their use in sentences.

e. Recognize and understand the function of collective and compound nouns in sentences.

f. Understand the relationship of nouns to other words in sentences: (a) nominative case, (b) possessive case, (c) objective case.

g. Know and understand use of gerunds and infinitives. Be able to use correctly in oral and written work.

h. Know and understand function of noun clauses. Be able to use correctly in oral and written work.

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*These skills can be reinforced effectively through practice in appropriate resource workbooks and programmed materials and by attention to their proper use in all written work.

3. TO DEVELOP THE ABILITY TO RECOGNIZE PRONOUNS AND UNDERSTAND THEIR FUNCTION IN SENTENCES.

3. a. Understand the personal pronouns as direct substitutes for nouns.

b. Know the concepts of person as they apply to pronouns.

c. Know the uses and forms of the nominative, possessive and objective cases of personal pronouns.

d. Understand function of antecedent and agreement of pronoun with antecedent.

e. Understand use of other kinds of pronouns: interrogative, relative, and demonstrative.

4. TO DEVELOP A CLEAR UNDERSTANDING OF THE VITAL ROLE OF VERBS IN SENTENCES.

4. a. Be able to recognize and use verbs with facility in sentences.

b. Understand transitive and intransitive verbs.

c. Be able to use correct subject-verb agreement in oral and written work.

5. TO DEVELOP AN UNDERSTANDING OF TIME RELATIONSHIPS EXPRESSED BY VERBS.

5. a. Identify, understand and use the three simple tenses: present, future, past.

b. Use and understand active and passive voice.

c. Understand and use perfect tenses.

d. Know the principal parts of verbs.

c. Understand and use the progressive and emphatic forms of verbs.

6. TO DEVELOP AN UNDERSTANDING OF CORRECT VERB USAGE.

6. a. Understand common errors in verb usage.

b. Develop correctness in the use of troublesome verbs.

7. TO DEVELOP AN UNDERSTANDING OF THE FUNCTION OF ADJECTIVES.

7. a. Understand classification and characteristics of adjectives.
    1. Descriptive
    2. Limiting

   b. Understand and use infinitives and participes.

   c. Recognize and use phrases and clauses as adjectives.

   d. Know the various positions adjectives may have in sentences.

   c. Use adjective to compare.

8. TO DEVELOP AN UNDERSTANDING OF THE FUNCTION OF ADVERBS.

8. a. Understand the use of adverbs in sentences.

   b. Recognize and use phrases and clauses as adverbs.

   c. Use verbals as adverbs and adverbs as modifiers of verbals.

   d. Overcome errors in the use of adverbs.

   e. Use adverbs to compare.

9. TO DEVELOP AN UNDERSTANDING OF THE USE OF CONNECTING WORDS IN A SENTENCE.

9. a. Understand the relationship expressed by subordinating and coordinating conjunctions in sentences.

   b. Understand the use of prepositions as connectives in sentences.

   c. Overcome problems in the use of easily confused prepositions and idiomatic prepostional phrases.

COMPOSITION

A.—THE SENTENCE

OBJECTIVES

1. **TO DEVELOP AN UNDERSTANDING OF THE BASIC SENTENCE PATTERN.**

1. a. Recognize complete and incomplete sentences.
   b. Write complete sentences.
   c. Understand the function of nouns and verbs (subjects and predicates) in basic sentences.
   d. Write declarative and interrogative sentences.

2. **TO DEVELOP SKILL IN EXPANDING BASIC SENTENCES.**

2. a. Use single word modifiers.
   b. Use phrases as modifiers.
   c. Use clauses as modifiers.

3. **TO DEVELOP AN UNDERSTANDING OF THE IMPORTANCE OF WORD ORDER TO MEANING, CLARITY, AND EMPHASIS**

3. a. Understand the relationship of word order to meaning.
   b. Understand the relationship of clause order to meaning.
   c. Write sentences using different word order.
   d. Use phrases in different positions.
   e. Revise run-on sentences.

4. **TO DEVELOP AN UNDERSTANDING OF THE USE OF THE PRONOUN.**

4. a. Use pronouns in basic and expanded sentences.

5. **TO DEVELOP AN UNDERSTANDING OF AND SKILL IN THE USE OF COMPOUNDING AND SUBORDINATING.**

5. a. Use compound subjects and predicates.

b. Write compound sentences, using conjunctions correctly.

c. Use compound phrases.

d. Use parallel structure.

e. Use sequential order for elements in a series for clarity and emphasis.

f. Use correlatives correctly.

g. Understand the structure and use of the loose sentence.

h. Understand the structure and use of the periodic sentence.

i. Use subordination to combine sentences.

j. Reduce basic sentences to phrases.

k. Subordinate by using single words, pairs of words, phrases, clauses, and basic sentence patterns.

l. Distinguish between compounding and subordinating.

6. TO DEVELOP STYLE IN SENTENCE WRITING.

6. a. Develop a sense of word choice.

b. Use variety in combining basic sentence patterns.

c. Use options in combining sentences.

d. Select words and sentence forms for clarity and emphasis.

7. TO DEVELOP SKILL IN THE USE OF SUBSTITUTION.

7. a. Understand substitution.

b. Use clauses to replace other elements in the sentence.

c. Use substitution for brevity and emphasis.

8. TO DEVELOP SKILL IN THE PROPER USE OF PRONUNCIATION AND CAPITALIZATION IN DIFFERENT TYPES OF SENTENCES.

8. a. Use capital letters correctly.

b. Use end punctuation correctly.

c. Use commas, colons, semicolons, and dashes as needed.

d. Use correct punctuation for direct and indirect quotations.

B.—ORGANIZATION AND DEVELOPMENT

1. TO DEVELOP AN UNDERSTANDING OF UNITY AND COHERENCE.

1. a. Develop effective topic sentences.
   b. Choose details to support the main idea.
   c. Use linking expressions.
   d. Order details for coherence.

2. TO DEVELOP AN UNDERSTANDING OF ORGANIZATION BY TIME ORDER.

2. a. Use time signals.
   b. Write events in chronological order.

3. TO DEVELOP AN UNDERSTANDING OF THE USE OF CAUSE AND EFFECT.

3. a. Recognize cause and effect.
   b. Use cause and effect in writing.

4. TO DEVELOP SKILL IN THE USE OF CLASSIFICATION.

4. a. Recognize classification as a means of organization.
   b. Use classification.
   c. Identify sub-classes.
   d. Classify ideas.
   e. Use classifications to clarify generalizations.

5. TO DEVELOP AN UNDERSTANDING OF THE USE OF DEFINITION.

5. a. Recognize and use contextual definitions.
   b. Use contrast in context definitions.
   c. Write logical definitions.
   d. Write imaginative definitions.
   e. Use definitions in exposition.

6. TO DEVELOP AN UNDERSTANDING OF ORGANIZATION BY COMPARISON AND CONTRAST.

6. a. Recognize similarities and differences.
   b. Compare similar items.
   c. Contrast similar items.
   d. Use comparison and contrast to develop an idea.
   e. Develop analogies.

7. TO DEVELOP AN UNDERSTANDING OF ORGANIZATION BY INDUCTION AND DEDUCTION.

7. a. Draw conclusions.
   b. Support an understanding.
   c. Organize by induction.
   d. Organize by deduction.
   e. Distinguish between induction and deduction.

8. TO DEVELOP AN UNDERSTANDING OF TONES.

8. a. Recognize the relationship between word choice and attitude.
   b. Recognize different points of view.
   c. Write from different points of view.
   d. Choose writing technique to suit a special purpose.

9. TO DEVELOP SKILL IN THE MECHANICS OF WRITING.

9. a. Use indentation to mark new paragraphs.
   b. Write titles and sub-titles correctly.
   c. Use proper margin spacing.
   d. Write clearly and neatly.
   e. Proofread and rewrite.
   f. Use footnotes and references correctly.

C.—ORAL COMMUNICATION

1. TO DEVELOP GOOD VOICE PRODUCTION.

1. a. Use breath control, resonance and flexibility of tone.

2. TO DEVELOP THE ABILITY TO ENUNCIATE AND PRONOUNCE WORDS CORRECTLY.

2. a. Speak clearly and distinctly, without slurring, muffling, or running words together.
   b. Pronounce words correctly, using proper vowel sounds, accenting correct syllables and without adding or deleting sounds.

3. TO DEVELOP SKILL IN THE USE OF CORRECT GRAMMAR AND USAGE.

3. a. Use correct grammar and usage.

4. TO DEVELOP SKILL IN THE USE OF INFORMAL AND FORMAL SPEAKING.

4. a. Participate in informal discussion groups.
   b. Use correctly the following social forms:
      1. Greetings and replies

        2. Answering the doorbell
        3. Introductions
        4. Using the telephone
        5. Excusing yourself
        6. Interrupting a conversation

c. Speak in front of a group:
    1. Tell a story
    2. Make announcements
    3. Give a report

d. Participate in speech activities:
    1. Debating
    2. Parliamentary procedure
    3. Take part in role playing
    4. Interviewing
    5. Drama
    6. Oral and choral reading

SUGGESTED TEACHING APPROACHES FOR DEVELOPING COMPOSITION SKILLS

In Phases One and Two it is recommended that the composition skills be closely integrated with reading, language, and literature. The type of basic skill work to be done in reading, language, and literature lends itself to close correlation with writing. For example, in working on the basic elements of a sentence, much practice can be provided in the writing of clear, concise, and properly punctuated sentences; or in studying simple stories, endless opportunities arise for the use of simple organizational skills, such as in writing a character description using effective topic sentences, unity of details, simple order of elements, and the basic mechanics of paragraph form.

Stress should be given to developing the ability to express one's thoughts clearly and concisely in writing both sentences and simple paragraphs. In addition to this, writing simple letters, both friendly and business, can be a suitable vehicle for practising many writing skills.

Through stress on oral communication, every effort should be made to correct faults in speech and to develop the ability to speak with confidence before a group.

In Phases Three and Four the basic sentence, organization, and communication skills need further refinement. Longer and more formal composition work can be undertaken particularly at the higher levels. This work may take the form of writing research reports, editorials, news releases, compositions and preparing and presenting debates, panel discussions and symposiums. Many students in Phase Four can benefit from instruction and practice in the various components or aspects of creative writing and preparation of term papers. Systematic instruction and practice should enable them to produce eventually some very sophisticated written work.

LITERATURE

Literature, which deals so closely with man and his vicarious experiences, must occupy a prominent place in the curriculum of the modern high school.

Teen-agers rapidly develop an increasing interest in the world around them—the world of the past, of the present and of the future. The complexities of love and of hatred, of courage and of cowardice, of conflict and of harmony become extremely important to boys and girls as they develop and mature. To gain an insight into these human problems, young adults should be led to discover that literature in all its different forms is the media that best performs this task.

The mastery of reading skills is a necessity before a student is confronted with a literary selection, whether it be poetry or prose, for one of the main objectives of a sound literature program is to enable a student to recognize and appreciate a piece of literature for its artistic form and beauty of expression.

General Objectives of a Literature Program

1. To develop an appreciation and love for literature in all its forms.
2. To develop in students an understanding of man in relation to himself and others.

3. To develop in students a basic understanding of the various literary forms.
4. To develop in students the ability to recognize and distinguish good literature from that which is worthless.
5. To develop the desire to read for pleasure and enjoyment.

SHORT STORY

Objectives

1. To develop an understanding of the characteristics of the short story.
2. To develop insight into the human personality and conflict of one's own life and the lives of others.

Understanding, Appreciation and Skills

1. Appreciate description of setting.
2. Understand character and recognize change that might occur within certain characters as the story progresses. Recognize influence one character might have on other.
3. Understand and determine development of plot.
4. Become sensitive to conflict. (Physical, classical, romantic, social, psychological)
5. Understand and determine climax.
6. Determine type of story. (Mystery, historical, love, adventure, etc.)
7. Understand and recognize figurative language.
8. Interpret allusions.
9. Interpret stated and implied meaning of story.
10. Recognize emotional atmosphere or mood of story.
11. Develop critical analysis.

DRAMA

Objectives

1. To develop an insight into and an appreciation of drama as a literary form.

2. To develop a keener understanding of human personality.
3. To develop an awareness of the subtleties of the authors as they portray life in its varied circumstances.
4. To develop imagination and creativity in students.
5. To develop an appreciation of the strength and great beauty of good literature.
7. To recognize and appreciate dialect.
8. To develop oral expression and good speech in students so they can speak with ease and confidence.

ESSAY

Objectives

1. To develop an understanding of the characteristics of the essay.
2. To develop the ability to preceive and appreciate mood that provoked author to write a certain essay.
3. To develop an understanding of the structure of essay.
4. To develop an appreciation of individual author's style.

Understandings, Appreciations and Skills

1. Identify the theme of an essay.
2. Recognize author's point of view.
3. Distinguish essay from short story:
    a) style of writing is often personal.
    b) personality of writer is often felt.
    c) presents an opinion or point of view for purpose of discussion, persuasion or explanation.
4. Perceive and appreciate individual thoughts and allusions that contribute to salient impression.
5. Observe and appreciate author's style of expression.

NOVEL

Objectives

1. To develop an understanding of the nature of the novel and the insight into human nature it provides.

Understandings, Appreciations and Skills

1. Recognize and appreciate structure of novel as contrasted with short story and essay.
2. Develop the ability to assess a novel for its literary value.
3. Become cognizant and respectful of cultures other than own.
4. Stimulate interest in Canadian heritage as well as that of other nations.
5. Develop healthy values and attitudes for one's self and a tolerance for values and attitudes of others.
6. Become aware of problems of others and develop sympathy for those less fortunate.
7. Develop the desire to read literature of good quality for pleasure and relaxation.

POETRY

Objectives

1. To develop a sensitivity and appreciation for the language of poetry.
2. To develop insight into the nature of poetry as a literary form.
3. To distinguish among the various forms of poetry.
4. To enable students to discover for themselves the rewarding experience provided by reading and understanding this fine artistic form of literature.

Understandings, Appreciations and Skills

1. Appreciate music, rhythm and rhyme in poetry.
2. Appreciate description in poetry.
3. Appreciate emotions and feelings in certain types of poetry.

4. Recognize and understand figures of speech.
5. Recognize theme of poem.
6. Recognize the various forms of poetry and be able to distinguish one from the other. (ballad, narrative, etc.)
7. Recognize certain poetry structure. (sonnet, ode, etc.)
8. Develop oral reading skills.

APPROACH

The above literature outline is simply a brief resume of objectives, understandings, appreciations and skills organized to allow creativity on the part of the English teacher. It is hoped that it will be used as a guide only. Since contact with literature should result in a keener social sensitivity the teacher should constantly create opportunities that will help transmit to students a delight in reading and comprehension of writings that really reveal the attitudes and values of man, past and present.

If we accept the fact that in the study of literature we are dealing with the experiences of human beings in their ordinary relations with one another and the circumstances which result from these experiences, then we must be prepared to lead students to an awareness of the order, unity and language employed by great writers in an attempt to convey their insights into human character sincerely and effectively.

To share the insight of any writer, a reader must be activated to respond to what he reads. It is the responsibility of the teacher of literature to awaken this response in students so that they will share more fully the feelings of the writer, identify themselves with certain characters or become aware of certain social problems.

Inherent in prose and poetry are major concepts and appreciations. Unlike other areas of the English program, literature does not emphasize the acquisition of skills, though at the discretion of the teacher skills can be developed in conjunction with the literature program. Many literary selections will provide opportunities that will involve creative writing and written expression in general. Rather than suggest activities for these skills, we feel that a teacher dealing with his own particular class is in a better position to organize stimulating activities as occasions present themselves.

The teacher's own creativity and skill in choosing and employing whatever methods best satisfy the needs of his class will determine the success with which the objectives of the literature program will be achieved.

It is recommended that several methods be tried and used in the teaching of literature. Lectures can be reinforced many times by films and film strips. Bulletin boards can be used effectively. Charts, posters and murals can be constructed by students. Records and tape recorders should be used frequently, especially in the teaching of poetry. We should always remember that poetry is "an art of the ear, not of the eye". Therefore it must be heard to be enjoyed and appreciated. Also in the teaching of poetry, memorization should be encouraged though not required.

One of the aims of any lesson in poetry should be to awaken a desire to read poetry and experience a feeling of delight and pleasure while doing so. With this in mind, teachers are cautioned not to teach poetic terms and terminology as separate entities but to present them in poetic context.

No effort was made in this outline to divide literature into different phases. As mentioned in the introduction, basic reading skills should be mastered before a student is introduced to literature per se. However, in Phase I an integrated program consisting of reading, writing, language and spelling is recommended. Phase II should provide remedial instruction in areas where student weaknesses are obvious. For other phases literary selections corresponding to students' age, interest and achievement should be selected and taught in varying degrees of complexity and depth, keeping in mind the needs of the students being taught.

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Gateway Language Arts Program. Levels 1-3. Toronto: Collier-MacMillan, 1966.

Learning Your Language. Books 1-2. **Follett Basic Learning Program – English.** Chicago: Follett Publishing Company, 1964.

MacMillan English Series. Books 7-9. Toronto: Collier-MacMillan, 1964.

New Approaches to Language and Composition. Books 7-8. Toronto: Laidlaw (Doubleday), 1969.

Simply English. Books 1-3. Toronto: Harrap, 1965.

Success in Language and Literature. Unit 2. Chicago: Follett Publishing Company, 1967.

Thinking and Writing Series. Books A, B. Toronto: Prentice-Hall, 1966.

Turner, Richard H. **Turner-Livingstone Reading Series.** Chicago: Follett Publishing Company, 1962.

SUGGESTED RESOURCE MATERIALS

The Laidlaw English Program. English 4, 5, and 6. Toronto: Laidlaw (Doubleday), 1967.

The Laidlaw English Program. Using Good English. Book I, II, and 9. Toronto: Laidlaw (Doubleday), 1967.

Modern English in Action. Books 7, 8, and 9. Toronto: D. C. Heath and Company, 1966.

The MacMillan English Series. Books 7, 8, and 9. Toronto: Collier-MacMillan, 1964.

Chapter VIII

A MATHEMATICS PROGRAM FOR A NONGRADED SECONDARY SCHOOL

Rationale

Deep dissatisfaction with the success of the efforts of our schools to offer a mathematics program which is realistic for all students prompted the authors to attempt to devise a mathematics curriculum which would be realistic for a nongraded secondary school. A serious effort was made to define the fundamentals of a sound mathematics program, to structure these fundamentals into sequential units of work, and to develop a system of organization for their implementation which would flexibly and appropriately accommodated the varied needs of the student body which is found in a typical comprehensive high school. This plan represents a major departure from the rigid lock-step program of the past which contributed to a contemptuous sense of failure on the part of an alarming number of students and to a smug superiority which arises from easy success on the part of a gifted minority.

Mathematics should be an essential part of the educational program of every secondary school student because of the significant contribution it has to make to the general education of the child. Through the study of mathematics in its finest forms students gain insight into the order of nature and the universe. It is an important tool in the study of the physical sciences. It has much to contribute to sharpening the powers of reasoning. The proper study of mathematics helps the student to learn to investigate, to probe, and to think clearly. It is highly effective in training a student to organize work in an efficient and concise way. Its practical usefulness in solving daily problems is readily apparent. Many personal business situations, from banking to filing income tax, demand a knowledge of mathematics. And finally, the concepts and tools of mathematics help the student to understand better the technical world in which he lives—the world of the computer, of automation, and of space travel.

The Organization of the Mathematics Program

In order to accommodate the needs of the great variety of students found in a typical comprehensive junior-senior high school containing at least eight hundred students, it is recommended that the mathematics program be organized vertically by levels and horizontally by phases. The levels should be geared to the number of years a student spends in the secondary school. Since a student will spend years 7, 8, 9, 10, 11, and 12 in the secondary school, courses are designed for levels 1, 2, 3, 4, 5, and 6. Level one corresponds to year seven, level two to year eight, and so on. An algebra course designated for level six obviously is more difficult than one demarcated for level five. Before a student is placed in a course at a higher level, he should be required to show mastery of the course that preceded it.

A phased system of horizontal organization facilities the appropriate placement of pupils within a particular level. A four-phased program is needed to accommodate pupil variability in the junior high school, and a five-phased program is needed for the senior high school. The reason for the addition of the fifth phase at the secondary level is to provide for independent study and research on the past of gifted students who are mature and self-directing.

Phase One Courses are especially designed for students who are so deficient in the basic mathematical skills that they need special attention in small classes. Students who are placed in this particular phase usually have limited academic ability. For them mathematics must be translated into concrete forms, and mastery of the fundamentals will require a great deal of reinforcement. These students are capable of learning pure theoretical mathematics to a very limited degree. Thus the mastery of certain appropriate basic aspects of modern mathematics should be combined with an extended study of computational skills and applied mathematics.

Phase Two Courses are designed for students of average or better ability who are deficient in the basic mathematical skills needed for success at their particular level. The courses offered at this level should be individualized to help each student overcome his peculiar deficiencies as quickly as possible so that he can perform at a higher phase.

Phase Three Courses are designed for students of average ability and achievement in mathematics. These students are capable of a reasonable degree of mastery of all the courses offered in this particular phase.

Phase Four Courses are designed for students of superior ability who have superior aptitude for and achievement in mathematics. At this phase basic concepts and operations of mathematics can be mastered in greater complexity and depth and can be applied to more difficult problems. The separation of these students from their average counterparts in similar courses should make it easier for their teachers to challenge them to a high degree of achievement.

Phase Five Courses are available for gifted students who demonstrate unusual aptitude for and interest in mathematics and who are mature enough to be capable of self-direction in a rigorous program of independent study and research. The courses for this phase are individualized in that they are worked out through joint consultation between the student and his staff advisor. The work of this phase should enable the school to detect its prospective mathematicians.

Student placement should be recommended on the basis of an analysis of the results of standardized achievement tests in mathematics and on teacher assessment of pupil performance. Both the student and his parents should be consulted on this matter. In spite of careful efforts to place students appropriately, mistakes will still be made. The timetable therefore should be structured in such a way that easy movement from one phase to another is possible.

TABLE I

PROPOSED COURSE OFFERINGS BY PHASE AND BY LEVEL

	Phase One	Phase Two	Phase Three	Phase Four	Phase Five
Level I	General Mathematics I	Remedial Mathematics I	Mathematics I	Mathematics I	—
Level II	General Mathematics II	Remedial Mathematics II	Mathematics II	Mathematics II	—
Level III	General Mathematics III	Remedial Mathematics III	Mathematics III	Mathematics III	—
Level IV	Intermediate Mathematics IV	Remedial Mathematics IV	Mathematics IV	Mathematics IV	Individually Prescribed Independent Study Courses
Level V	Advanced General Mathematics V	Remedial Mathematics V	Mathematics V	Mathematics V	
Level VI	Consumer Mathematics VI	Remedial Mathematics VI	Mathematics VI	Mathematics VI	

Course Offerings

Table One presents an outline of course offerings by phases and by levels that is sufficiently broad and flexible to accommodate the varied abilities and achievement of the diverse student body found in a typical comprehensive secondary school. The nature of these courses is clarified in the course outlines that follow. These course outlines are developed in such a way that they present the objectives of the courses to be offered, the concepts and operations which are basic to each course, the content through which the basic concepts and operations are to be developed, and suggested teaching techniques or procedures and/or learning activities. An attempt was made to define the basic concepts and operations in ascending order of difficulty and to run them spirally through the courses in increasingly more complex forms and in relation to more difficult problems. If this attempt was successful, the courses offered should fit together to form a sequential mathematics program.

To provide a concrete example of the sequential development of a concept, a model of the development of the concept of matrices at Level Six is presented at the end of this chapter.

COURSE OUTLINES FOR PHASE ONE

Introduction

The basic characteristics of the students who fit into this particular phase should be a major determinant of the kind of work which is prescribed for them. For the most part, students in this phase are found (1) to have a reading problem, (2) to be weak in basic computational skills, (3) to have a short attention span, and (4) to show signs of poor ability to form abstractions, and (5) to have poor retention. This information would lead one to believe that the mathematics courses prescribed for these students should be very basic, concrete, and applicable to real life situations. In all courses great stress should be put on the practical application of the basic concepts and operations.

Objectives

The following is an outline of the general objectives of the courses offered in Phase One.

1. To develop an understanding of fundamental notions of mathematics.
2. To experience the opportunity for success in dealing with mathematics.
3. To develop skill in reading mathematics.
4. To develop the habit of estimating answers.
5. To develop effective problem solving techniques.
6. To develop the mathematical understandings and skills necessary for future work in the trades or business.
7. To develop the ability to apply mathematics to the solution of the problems involved in daily living.
8. To develop an appreciation of the logic of mathematcs.

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GENERAL MATHEMATICS I

Level I, Phase I

Concepts and Operations **Unit I System of integers**	**Content and Procedures for Its Development**
1. Meaning of integer	1. The definition of an integer is a whole number. The system of integers contains the positive whole numbers, 0, and an additive inverse of each. Ex. -4, -3, -2, -1, 0, 1, 2, 3.
2. Addition	2. Addition will emphasize positive integers. Some students may progress to the addition of signed numbers. Addition on number lines, moving to the right. Addition using money. Simple word problems dealing with games, scores, money.
3. Subtraction	3. Subtraction will generally not deal with subtracting inverses. Only problems which give positive numbers for answers should be attempted at first. Later for the more capable students negative numbers should be introduced. Subtraction is the same as the addition of the additive inverse. Subtraction on number lines—moving to left.

	Subtraction as seen in business problems. Problems clerks deal with relating to the above integers should be stressed. Space and travel problems can also prove to be of great interest to these students.
4. Multiplication	4. Multiplication of positive integers and zero only. Quick way of addition. Mathematics multiplication table to be approached in different ways to avoid boredom. Games can be developed to accomplish this objective. Word problems utilizing these mathematical operations should be emphasized.
5. Division	5. Division of positive integers. Word problems which involve the application of these kinds of division.
Unit II Fractions	
1. G. C. F. (greatest common factor)	1. The meaning of a fraction as part of a whole can be developed through use of models of pies, squares, money, etc. This can help to demonstrate why denominators are different and why different number of parts are required to make up different wholes.
2. L. C. D. (Lowest common 2. demoninator)	2. To introduce review knowledge of prime numbers. Factor numbers to their

	prime and show that common primes are solutions. 12 and 16 3:4 4:4 3:2:2 2:2:2:2 2:2 is common G.C.F. = 4
3. Addition of fractions	3. Addition with like and unlike denominators. Word problems involving both should be emphasized.
4. Multiplication of fractions	4. Demonstrate the multiplication and division of fractions by using models.
Unit III Geometry	
1. Recognition of figures. — curves — triangles — rectangles — squares — quadrilaterals	1. Students can be taught to find the connection between the forms in his immediate world and specific geometric figures. They should be able to recognize — simples curves — polygons — triangles — rectangles — squares Geometric figures should be available for the students to manipulate.
2. Perimeter	2. Meaning of perimeter. Demonstrate what is meant by total distance around a figure. The students should learn how to find the perimeters of triangles, squares, quadrilaterals, rectangles.
3. Area	3. The concept of area. This concept should have models associated with it be-

cause the child will understand this concept better if it is taught in a concrete form. Models could also be used to demonstrate the difference between area and perimeter. The area of a triangle should be taught in relation to the area of a rectangle. Use should be made of verbal problems dealing with perimeter and area. Ex. fence, acres, areas of walls.

Unit IV Decimals

1. Place values	1. Demonstrate the values decimals have. The use of our money system may be very helpful for this purpose.
2-3. Addition and Subtraction	2-3. In addition and subtraction decimals are placed one under another. Demonstrate why this is so through the use of concrete examples.
4-5. Multiplication and Division	4-5. Use of approximation is important here. Application to personal, financial and business problems can provide effective reinforcement.

Unit V Per Cent

1. Concept of per cent	1. Show how per cent is used to show part of a hundred. Ex. 100% is a hundred parts of a hundred and equal to one whole. The student should then be able to express per cent as a decimal fraction.

2. Verbal problems for computational skills	2. The word problems can be of such a nature (e.g. 25% off a $10.00 chair) as to serve a very practical meaning for the student. A project for each student could involve an actual trip to a store to tabulate actual discounts and prepare a report on them. Here also the students could have discussions as to whether or not a discount is a good buy or simply a sales gimmick. Sales catalogues and sales ads in newspapers can be used to pose many practical problems which can reinforce the application of this concept. If preliminary testing reveals that students show sufficient mastery of these concepts and skills for their particular level, they should be moved on to the work of the next phase or level.

GENERAL MATHEMATICS II

Level II, Phase I

In this course outline the basic components of each concept and/or operation are stated along with suggestions for suitable teaching or learning activities.

Unit I Number System

1. In the number system essential work consists of the following:
   a) Operations with whole numbers including addition, subtraction, multiplication and division.

b) Units of measure to include: liquid measure, dry measure and linear measure.

c) A study of the number line which would include the addition and subtraction aspects. Students should be required to draw number lines.

2. Properties of Numbers

a) This involves the study of commutative properties, associative properties, negative property, zero property (additive identity). Example:

b) Extensive use of problems is suggested in order to develop facility in these operations.

c) World problems should be introduced wherever possible and care should be taken not to use words which are beyond the vocabulary scope of the students involved.

3. a) The properties of whole numbers should be extended into fractions to include addition and subtraction. Common fractions and mixed numbers shall be considered appropriate. Concrete examples pertaining to kits, objects, models, liquids, money and time should be employed.

b) Student participation in projects growing out of a study of these fundamentals would generate enthusiasm for and greater interest in mathematics in general.

Unit II Set Theory

1. The notion of sets and the fundamental relationships between sets are important to the study of mathematics. A thorough understanding of the basic ideas and the symbolism associated with the study of sets are of paramount importance.

Some of the basics are:

a) The definition of set.

b) Types of sets—universal set, finite set, infinite set, null set or empty set, subset, complement, disjoint set, union and intersection with diagrams, Venn diagrams.

c) The basic ways of stating a set are: 1) Listins Method, 2) Description Method.

d) Set symbolism: Empty set $\emptyset$; Listing Method [ ]; Descriptive [x/x is an integer, $x > o$, $x \angle 5$; Greater than $>$; Less than $\angle$; Contained in $\subset$; Contains $\supset$; Union $\cup$; Intersection $\cap$; Circles, Universal Set U.

Unit III Geometry

1. Some of the fundamentals covered in this branch of mathematics can open new horizons for any student. Subject matter which could be studied is the following:
   Parallel lines, square, rectangle, parallelogram, triangles, legs of triangle, altitude of triangle, right angles
2. Developing the ability to distinguish various fgiures such as trapezoid, quadrilateral, parallelogram, square and rectangle has many practical implications.
3. Distinctions between the area, perimeter and volume of basic objects should be stressed.
4. Circles—diameter, radius, circumference, number of degrees in a circle, half circle and quarter of a circle, circle graphs.
5. Elementary geometry could be most stimulating because of the wealth of concrete examples which are accessible. The school building and yard can provide the base for all sorts of concrete examples suitable for reinforcing basic geometry.

Level III, Phase I

Unit I Fractions

Understandings and Skills	**Teaching Techniques and Learning Experiences**
1. To develop the meaning of the term fraction.	1. Practice in dividing wholes into parts.
2. To develop skill in changing an improper fraction to a mixed number.	2. Concrete examples utilizing a ruler or a circle can be used to demonstrate the idea of equivalent fractions.
3. To develop skill in changing a mixed number to an improper fraction.	3. Exercises should be used to reinforce this skill.

4. To develop skill in changing mixed numbers to their simplest forms.	4. Demonstration procedures and exercises are recommended.
5. To develop skill in find-the L.C.D.	5. Use appropriate exercises.
6. Basic computation of fractions.	6. Test students for proficiency and then select exercises appropriate for overcoming their weaknesses.

Unit II Decimal Fractions

Understandings and Skills	Teaching Techniques and Learning Experiences
1. To develop skill in reading and writing decimals. 2. To develop skill in rounding decimals. 3. To develop skill in computing with decimals. 4. To develop skill in solving verbal problems containing decimals.	A diagnostic test should be administered at the beginning of this unit and then appropriate demonstrations and exercises to overcome the manifested weaknesses of the students should be developed. Problems involving the practical application of these skills should also be used for purposes of reinforcement.
6. To develop skill in changing common fractions to decimals and decimals to common fractions. 7. Tt develop skill in computing mixed groups of common fractions and decimals.	

Unit III Per cent

Understandings and Skills	Teaching Techniques and Learning Experiences
1. To develop the meaning of the term per cent.	The same procedure is recommended for the development of this unit as was recommend for Unit II.
2. To develop skill in changing per cent to decimals and decimals to per cent.	
3. To develop skill in changing per cents to common fractions and common fractions to per cents.	
4. To develop skill in finding rate, percentage, and base in applying these concepts to practical situations.	

Unit IV Basic Units of Measurements and their Practical Application

Understandings and Skills	Teaching Techniques and Learning Experiences
1. To develop skill in changing a given number of linear units of one denomination to units of another denomination.	1. Practice in conversion from one unit to another is needed.
2. To understand the differences among a line, a segment, and a ray.	2. Demonstration and practice is recommended.
3. To develop an understanding of different kinds of lines—straight, curved, broken, vertical, horizontal, slanting, intersecting, parallel, perpendicular.	3. The drawing of these lines will reinforce an understanding of their differences.

4. To develop skill in reading a ruler.	4. Practice in reading commonly used rulers is recommended.
5. To develop skill in drawing to scale.	5. Comparisons should be made between drawing, plans, maps and the actual configurations they represent.

Understandings and Skills	**Teaching Techniques and Learning Experiences**
6. To develop skill in recognizing and drawing many kinds of figures— (a) Quadrilaterals — rectangle, square, parallelogram, trapezoid. (b) 5, 6, 7, 8, 10 and 12 sided figures. (c) The parts of a circle and the ratio that exists between the circumference and the diameter. (d) Figures with depth — rectangular, solid cube, cylinder, sphere, cone, pyramid.	6. Practice in drawing and labelling all these fgiures is effective reinforcement.
7. To develop skill in finding the perimeter and area of a variety of geometric figures.	7. A great deal of practice on appropriate exercises and problems is recommended. Concrete demonstration using school surfaces and areas is needed.
8. To develop an understanding of the meaning of cubical capacity and	8. Concrete demonstrations utilizing articles that take the form of a rectangle, cube, or square is essen-

skill in determining volume.	tial along with practice in writing out appropriate exercises and problems on volume.

Unit V Consumer Problems

Understandings and Skills	**Teaching Techniques and Learning Experiences**
1. To develop an understanding of problems relating to income.	1. Problems relating to budgeting and computing income tax are appropriate.
2. To develop insight into the nature of installment buying and the meaning of money, interest and mortgage.	2. Practical problems involving these processes are recommended.
3. To develop an understanding of insurance.	3. Problems relating to car, property, and life insurance would prove very meaningful. In fact, practical projects that are realistic for students at this level could be used to develop any of these understandings.

INTEMEDIATE MATHEMATICS IV

Level IV, Phase I

Unit I Fundamental Arithmetic

Concept, Content, and procedures

1. Extensive review of fundamentals of arithmetic.
   - (a) Skills in Clock Mathematics which would include addition and multiplication.
   - (b) Thermometer Mathematics: this consists of addition, subtraction, multiplication and division.
   - (c) Mathematics of science and technology.
   - (d) Multiplication of decimals, division of approximate numbers, addition and subtraction of fractions, division of fractions.

Unit II Number Puzzles

1. Number puzzles. These involve solving equations requiring addition and subtraction, multiplication and division.
2. Solving puzzles about two numbers.

Unit III Formula Problems

1. Arithmetic formulas.
    - (a) Writing formulas from tables.
    - (b) Writing scientific formulas.
    - (c) Solving formula problems by substitution.
    - (d) Using equations to solve formulas.
    - (e) Interchanging formulas.
    - (f) Introduction to the language variation.
    - (g) Solving problems involving variation.

Unit IV Algebra

1. Extension of addition, subtraction, multiplication and division.
2. Development of algebraic skills, through factoring equations containing numerical coefficients.
3. Verbal problems applicable to everyday situations can be used to reinforce the fundamentals.

Unit V Geometry

1. Definitions of all types of angles.
2. Experimentation with angles.
3. Experiments with line segments.
4. Drawing triangles.
5. Lines and experiments with lines of a triangle.
6. Types of triangles.
7. Bisecting angles and lines.
8. Drawing on perpendiculars.
9. Using the compass and straight edge pertaining to drawings.

10. Drawing quadrilaterals, other polygons, lines of a circle, and angles of a circle.
11. Determining areas of prisms, cylinders, pyramids, cones and spheres.

Unit VI Indirect Measurement

1. Finding angles of height and depth.
2. Finding the height of an object.
3. Finding an angle of width.
4. Experimenting on right angles.

Unit VII Modern Problems

1. The theory of sets; incomplete pools; polygon graphs; dice combinations; tossing coins; picking a card.
2. Table of squares and square roots.
3. Two dimensional numbers: Coordinates; tables of values; comparison graphs, time-change.
4. Graphs: Ex: Showing distribution of graphs.
5. Logical thinking: The chain of logic.
6. Circumstantial evidence: Reasoning in mathematics; the error of insufficient evidence; the converse error; the inverse error.
7. These concepts and operations should be taught in relation to problems and situations which are very real and practical to the students.

ADVANCED GENERAL MATHEMATICS V

Level V, Phase I

Background

Unit I — 1. Need for Mathematics

Two or more periods should be devoted to a discussion of the need for mathematcis. From the summer work experiences of various students the class can be brought to see the importance of mathematics in their daily lives.

Examples: How Bob needed a knowledge of mathematics in his job as gas attendant or how necessary it was to Mary in her job as clerk at a corner grocery store.

A number of periods could then be allotted to illustrating the need for the various kinds of mathematics which will be taught in this course. Practical exctrpts can be chosen from each unit.

2. History of Mathematics

Student interest in mathematics is aroused by delving into its history to see how mathematical symbols and axioms gradually grew from the early Babylonians, Egyptians and Greeks to the highly dtveloped algebra under the Hindu-Arabia peoples.

Unit II Formulas, Areas, Volumes

1. Use of formulas for:
   (a) Area of triangles, rectangles, squares, parallelograms and trapezoids.
   (b) Volume of rectangular solid
   cylinder
   pyramid
   cone
   (c) Circumference and area of circle.

To make this unit meaningful actual experiments with and practical problems utilizing the above figures must be stressed. This unit should involve the reinforcement and extension of ideas previously developed.

Unit III Making use of Algebra

Since students are already familiar with the use of letters in formulas to express relationships, it is easy for them to see how letters represent numbers in algebra.

1. Topics in algebra
   (a) variables
   (b) linear equations
   (c) solution set
   (d) using equations to solve problems
   (e) signed numbers—review
   (f) graphing linear equations

Again the teacher introduces problems centered around actual situations. This is followed by the problems suggested by the students.

Unit IV Applied Mathematics

For the girls: Mathematics for the home

1. Furnishings—cost
2. Food—cost

Project: Budgeting for a family

For the boys: Mathematics of the mechanical world

Study of electricity
or Scale drawing

A project relating to these ideas should be developed.

Unit V Magic Squares and Sets

To create a change of pace and to arouse renewed interest the teacher may devote a couple of weeks to "Magic Squares." The "Magic Square" dates back to the very early Chinese and was reputedly engraved on the back of a sacred tortoise found near the Yellow River. This was a three by three square whose magic number was 15. The student examines a variety of magic squares and attempts to draw up their own.

1. Beyond a change from something dull to something interesting the study of the magic square helps the students to develop the habit of seeking pattern, design, and structure.
2. It gives the student a better insight into mathematical relationships and helps him to see the relationships between arithmetic, algebra and geometry.
3. It shows the value of checking, creates an atmosphere of enjoyment and reveals the delight of discovery.

Unit VI Geometry

1. This unit is closely tied in with Unit II. In this unit the student constructs the various polygons, measures their sides and angles, and states conclusions.

   Topics: a) Undefined terms: point, line, between.

b) Defined terms: line segment.

c) Axioms: what is accepted as truth.

d) Theorems: what must be proved.

e) Parallel lines.

f) Various polygons (see Unit IV).

g) Pythogoras theorem and its applications.

h) Similar triangles.

Time and student interest will determine how far these topics will be covered.

CONSUMER MATHEMATICS VI

Level VI, Phase I

Understanding	**Suggested Learning Experiences**
Unit I Borrowing Money from a Bank	
1. Personal loans	1. Visits made to places of financial business (banks, finance companies, credit unions, district income tax office).
2. Company loans, notes and drafts	2. Invite knowledgeable personnel to the classroom to discuss and answer student questions.
3. Discounting a non-interest - bearing note or draft	3. All sorts of practical problems can be developed to reinforce these understandings.
4. Discounting an interest-bearing note	
Unit II Compound Interest and Discount	
1. Long-term financing	Practical problems requiring the utilizing of these concepts should be developed.

2. Compound interest
3. Compound interest terms
4. Compounding interest more often than yearly
5. Compound amount tables
6. Present worth
7. Present worth tables

Unit III Installment Buying and Selling

1. Credit buying
2. Types of customer accounts
3. The carrying charges
4. The rate of interest charged
5. The revolving budget account
6. Purchasing an automobile

Practical projects involving the utilization of these concepts should be arranged in consultation with the pupils.

Unit IV Income Tax

1. Individual income tax, income and deductions
2. Calculation of tax
3. The income tax return
4. Provincial tax credits
5. Corporate income tax
6. Depreciation
7. Capital cost allowance
8. Business losses

Income tax forms should be completed by the students. Case studies of particular business should be examined to illustrate these ideas.

9. Tax benefits in sale and lease back

Unit V Taxation

1. Municipal taxation
2. Excise taxes
3. Custom duties
4. Other taxes

Problems involving practical examples of all these taxes should be utilized.

Unit VI Insurance

1. Life
2. Fire
3. Automobile

Case studies obtained from insurance companies should be used to study the relative merits of these kinds of insurance and to provide information for calculating the actual cost of various forms of insurance in relation to coverage or benefits.

The Nature of the Mathematics Prescription for Phase Two

Phase Two Courses are designed for students of average or better ability whose deficiency in the basic mathematical skills and concepts deters them from success in the courses prescribed for higher phases at their particular level. It is recommended that six remedial courses be offered from Levels One to Six so that remedial work at a particular level will provide the necessary background to perform successfully at the same level in a higher phase. For example, remedial work at Level One should provide the mathematical background needed for success in Phase Three or Four Courses offered at Level One.

For courses offered in Phase Two no particular prescription or basic outline will be suggested because it is our belief that a remedial course should be individualized to enable each student to overcomt his particular deficiencies. The work of all these courses should be preceded by careful diagnostic testing to detect the peculiar weakness of each student. On the basis of an analysis of these tests, suitable materials should be prescribed for each pupil, and he should be encouraged to move through them as quickly as possible in order that he may move back into the mathematics for his level at a higher phase. A large variety of programmed or semi-programmed materials, ranging from grades three to twelve in achievement levels, is needed to facilitate the work of this phase. In addition to these programmed materials, the use of manipulative material, remedial kits, and mathematics puzzles and games is also recommended. The nature of this course demands that class size be kept as small as possible and that grouping within the class be done primarily on the basis of achievement.

While a particular prescription of work would defeat the purpose of remedial courses, the following outline of common weaknesses found among students who are having difficulties in mathematics may prove to be helpful to the remedial teacher.

1) Inaccuracy in performing the basic operations of addition, subtraction, multiplication and division of whole numbers.
2) Inability to add, subtract, multiply and divide common fractions.
3) Lack of understanding of decimal fractions and ability to perform basic operations with decimals.
4) Inability to approximate answers.
5) Failure to understand symbols and formulas.
6) Difficulty in substituting values in formulas.
7) Difficulty in reasoning.
8) Difficulty in reading verbal problems.

Common Weaknesses in Algebra

1) Using signed numbers.
2) Using operations within parentheses.
3) Relating literal fractions with fractions having numerical terms.
4) Adding, multiplying, subtracting and dividing whole numbers.
5) Solving linear equations algebraically and graphically.
6) Solving quadratic equations by four methods.

COURSE OUTLINES FOR PHASE THREE

INTRODUCTION

Phase Three Courses are designed for students of average ability and achievement in mathematics. The major difference between the achievement of students in Phase Three and those in Phase Four lies in the complexity and depth in which they can treat the designated concepts and operations, the difficulty of the problems to which they can apply these concepts and operations, and the amount of time mastery will take.

General Objectives

1. To develop a better understanding of the real meaning of mathematics.
2. To develop an understanding of the postulates of mathematics as the foundation for the entire study of algebra.
3. To develop the thought processes of mathematics so that the student will view each branch of mathematics as a unified structure rather than as a disconnected set of tricks and rules.
4. To develop the ability to transfer knowledge of operations from the concrete to the abstract.
5. To develop an understanding of the use of sets as unifying themes.
6. To develop the ability to discover mathematical relationships on one's own.
7. To develop insight into symbolic logic through the study of geometry.

MATHEMATICS ONE

Level I, Phase III

Concepts and Operations	Content and Procedures for its Development
Unit I The Number System	
1. To develop skill in working with rational numbers with emphasis on the following:	1. Through appropriate exercises and problem solving activities, students should become proficient in working with:

(a) Additive identity

(b) All other numbers of arithmetic — fractions, whole numbers, improper fractions, decimals

(c) Additive inverses of (b)

(d) Four basic operations (+, –, x, ÷)

(a) Addition and subtraction of rational numbers

(b) The number line

(c) Simple equations without a variable

(d) Inverse relations

(e) Simple word phrases and problems

(f) Estimation of answers

(g) Multiplication and division of rational numbers

(h) Multiplication and division of three digit numbers

(i) Checking of answers using the commutative property

(j) Principles which govern the multiplication and division of zero and one.

Practical problems and examples pertaining to the following topics will help students understand these concepts:

(a) space travel

(b) weights on moon

(c) money

(d) shopping

(e) bones in the human body

(f) weights of people

(a) heights of waterfalls, using maps

(h) heights of mountains

(i) scores in sports

(j) calorie count

(k) population

(l) bridge length

(m) the number line itself

Unit II Sets

1. To develop an understanding of set notation and to show how sets are used in all types of mathematics

1. Students require a knowledge of:

(a) Definition

(b) Kinds of sets

1) universal 5) finite

2) subsets 6) infinite

3) complement 7) disjoint

4) empty

This can be demonstrated and reinforced through the use of sets of playing cards, sets using colored paper, Venn diagrams.

(c) Elements or members of sets

(d) Symbols

1) set notation [1, 2, 3, 4 . . .]
2) intersection $A \cap B$
3) union $A \cup B$
4) empty set $\emptyset$ or [ ]
5) contains $\supset$ (does not contain $\not\supset$)
6) is contained in $\subset$ (is not contained in $\not\subset$)

7) such that |
8) member $\&$, is not a member $\not\&$
9) complement or prime A^1
10) solution set
11) universal set

(e) Ways of naming sets

1) listing (specific—using symbols)

2) descriptive (general — using words)

This knowledge can be reinforced by having students make up their own sets relating to things in which they might be interested, such as hockey or baseball games.

Unit III Properties of Numbers

1. To develop an understanding of the basic rules that form the foundation for all mathematics. These will include properties of numbers and axioms.

1. Students must have an understanding of the properties of numbers and how they relate to mathematical problems. A working knowledge of the following properties is suggested:

(a) closure

(b) commutative

(c) associative

(d) negative

Unit IV Problem Solving	(e) zero or additive identity (f) reciprocal (g) unity or multiplicative inverse (h) distributive
1. To develop a systematic approach to problem solving.	1. Students must develop a a logical sequence in solving word problems by: (a) Discovery (b) Explanation (c) Adequate repetition (d) Knowledge of results (e) Reviews (f) Evaluation Frequently students should be encouraged to create problems of their own and then to analyze them for logical sequence.
Unit V Geometry	
1. To develop the skills used in finding: (a) Measurements (b) Perimeter, circumference, area and volume	1. Exercises should be devised to develop skill in: (a) Drawing to scale (b) Using formulas and methods of finding the perimeter and area of triangles, rectangles, parallelograms, trapezoids and circles. Using formulas and methods of finding volume of rectangular solids, cylinders, cones, and spheres.

(c) The relation between the metric system and the British system	(c) Using the various units in the metric system — meter, kilometer, grams, kilogram, liter.
(d) Other basic principles of geometry	(d) Using the concept of point and sets of points (line, plane, circle); findings the intersection and union of sets of points; using sets to define a ray, an angle, and a triangle.
	Road maps and projects in industrial arts can be very helpful in reinforcing these understandings and skills.

MATHEMATICS TWO

Level II, Phase III

Concepts and Operations	**Content and Procedure for its Development**
Unit I System of Integers	
1. Addition of signed numbers (Integers)	1. The meaning of a system of integers can be demonstrated by the use of these signed numbers on a number line — 1, 2, 3, 0, -1, -2, -3. (a) 1. Addition of two positive integers. $a+b$ $3+4=7$ 2. Addition of a positive number and an inverse: Subtract absolute values of numbers and take sign of the larger. $4+-3=+1$ $-4+3=-1$ 3. Addition of two inverse numbers. $-4+-3=-7$ 4. Addition of a number and its additive inverse. $4+-4=0$ 5. Addition of a number and zero. $3+0=3$

2. Subtraction of signed integers	2. Subtraction is the same as adding the additive inverse. Ex. 6 - 3 = 6 + -3 7 - -3 = 7 + +4
3. Multiplication of signed integers	3. (a) Multiplication of two positive integers. +3 x +4 = 12 (b) Multiplication of a positive and an inverse integer. +3 x -4 = -12 -3 x +4 = -12 (c) Multiplication of two inverse integers. -3 x -4 = +12 (d) Multiplicative identity = 1 (e) Multiplication by 0. 3 x 0 = 0
4. Absolute Value	4. Absolute value is distance (positive) from the number to origin. Word problems should accompany each of the above sections to help the students realize how to analyze a problem.

Unit II Exponents and Scientific Notation

1. Concept and computational skills	1. Exponents – new ways of expressing a number. Ex. 3^4 3 is base; 4 is exponent and 3 menas 3:3:3:3 = 81. (a) $3^4 . 3^5 = 3^9$ – Multiplication of like bases – add exponents. (b) $\frac{3^8}{3^3} = 3^{8-3} = 3^5$ – Division of like bases – subtract exponents. (c) $(3^3)^4 = 3^{12}$ – Power of power Multiply exponents (d) $\frac{1}{a^m} = a^{-m}$ (e) $6^0 = 1$ $\frac{6^2}{6^2} = 6^0 = 1$ – Any number to exponent zero is equal to one. Appropriate exercises should be used to reinforce the above.
2. Scientific notation	2. Scientific notation – A number expressed in such a manner that there is only one significant digit before decimal times ten to some exponent. Ex. 3.41×10^6 2.08 xx 10^{-31} (a) Operations with 10 and and powers of 10. Movement of decimal (b) Expressing numbers in scientific notation. (c) Multiplication of numbers using scientific notation.

Unit III Geometry	In this unit the student gets a good look at the various instruments and their uses.
1. Construction	1. (a) Draw a segment equal to a given segment. (b) Draw an angle equal to a given angle. (c) Bisect a given segment. (d) Bisect a given angle. (e) Draw a line perpendicular to a line through a given point on the line.
2. Parallel lines	2. (a) Transversal. (b) Interior and exterior angles. (c) Alternate and opposite angles. (d) Corresponding angles. (e) Combination problems involving degrees in straight lines and triangles.
3. Angles	3. (a) Acute (b) Right (c) Obtuse (d) Straight (e) Reflex Students should practice drawing these angles in order to reinforce their understanding the differences among them.

4. Quadrilaterals	4. (a) General quadrilateral (b) Trapezoid (c) Parallelogram (d) Rectangle (e) Rhombus (f) Square Through concrete exposition the student should be taught the properties of each of the above. Models should be available for easy reference, and drawing should be assigned to reinforce the differences among them.
Unit IV System of Rational Numbers	
1. Set of rationals	1. The set of rationals is made up of all the natural numbers, an additive inverse of each, O, and the set of arithmetic numbers. Ex. –3, 1/2, –3/8, 0, 5. Use of number line to order the rationals in terms of greater than (>) and less than (∠).
2. Basic computational skills	2. Addition, Subtraction, Multiplication and Division of rational numbers.
3. Equations	3. Solving equations experimentally (tral and error).
Unit V Geometry (Formulas and Application)	
1. Circle	1. Construction of circle, radius, diameter, circumference.

	$d = 2r$ $C = 2\pi r$ problems solving fro C. d, or r $C = \pi d$
2. Areas and Perimeter	2. Area and/or perimeter of the following: rectangles trapezoid squares parallelogram rhombi circle quadrilaterals This problem should be stated in such a way that they require the pupil to apply these concepts to real life situations. This unit offers special opportunity for word problems.
3. Pythagorean theorem	

MATHEMATICS THREE

Level III, Phase III

Unit I Real Numbers

1. Extending the number line—integers.	1. Students should be taught to develop a number line in such a way that they become proficient in dealing with integers and their inverses. Sufficient practice should be provided until sign numbers and their operations become an integral part of the pupil's knowledge.
2. Properties of order on the real number line.	2. The practical application of this concept can be demonstrated through prob-

(a) Opposites

(b) Comparing numbers

3. Operating with directed numbers.

   (a) Addition on the number line

   1. properties of addition —commuative, associative, the identity element, addition property of opposites.

   (b) Properties of absolute value

4. Multiplying directed numbers.

   (a) Properties of multiplication — closure, commutative, associative, distributive, multiplicative, property of zero and inverse one, identity element.

5. Dividing directed numbers —the multplicative inverses or reciprocals.

Unit II Operations with

Polynomials

1. The meaning of the term polynomial — monomial, binomial, trinomial.
2. Adding polynomials.

4. Again, the number line can be used to demonstrate this operation.
   This can be demonstrated through its application to problems relating to water flowing into and out of a tank.

5. Division problems should be developed which require the replacement of the divisor by its reciprocal, and then multiply.

1. Equations should be used to demonstrate these understandings.

2. Demonstration and practice is required in the case of all these operations.

   lems relating to the use of the thermometer and the elevator.

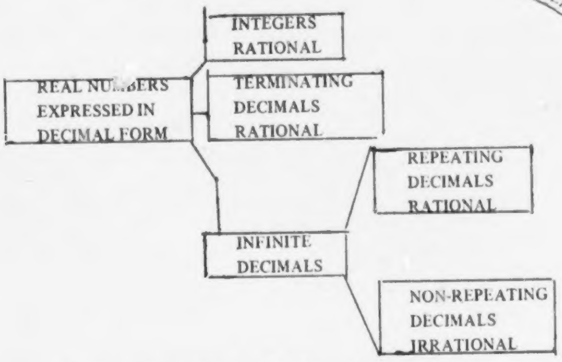
3. All these operations can be demonstrated and reinforced through the use of the number line. Students should be encouraged to make their own number lines.

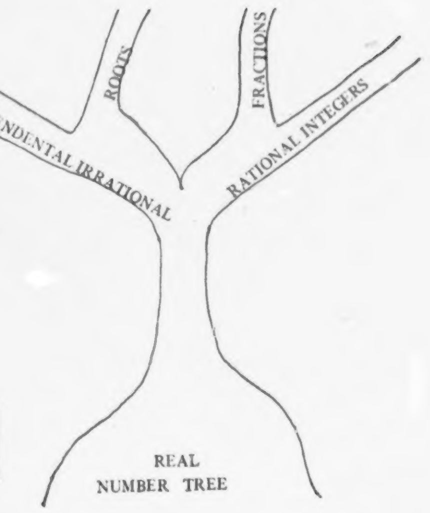
3. Multiplying polynomials.	
4. Dividing polynomials.	
Unit III Products and Factors	
1. Multiplying by a monomial.	1. Practice exercises are needed to reinforce these operations.
2. Distinguished between prime and composite numbers.	2. A review of the sieve of Eratosthenes is very appropriate.
3. Finding common monomial factors.	
4. Squaring binomials.	
5. Factoring binomials.	
6. Multiplying the sum and difference of two quantities.	
7. Factoring the difference of two squares.	
8. Multiplying binomials.	
9. Factoring quadratic trinomials.	
Unit IV Using Equations to Solve Problems	Problems relating to the students' environment should be identified for purposes of reinforcing the utilization of equations. Interesting problems can serve as an excellent vehicle for demonstrating the practical application of algebra.

MATHEMATICS FOUR
Level IV, Phase III

Unit I Roots, Rational and Irrational numbers:

1. Introduction to tables of squares and square roots; Computing approximate square roots.
2. Rational and Irrational Numbers:


REAL NUMBERS EXPRESSED IN DECIMAL FORM
INTEGERS RATIONAL
TERMINATING DECIMALS RATIONAL
INFINITE DECIMALS
REPEATING DECIMALS RATIONAL
NON-REPEATING DECIMALS IRRATIONAL


TRANSCENDENTAL IRRATIONAL
ROOTS
FRACTIONS
RATIONAL INTEGERS
REAL NUMBER TREE

All these understandings can be reinforced through appropriate exercises.

Unit II Simplest Radical Form

1. Addition, subtraction, multiplication, and division of radicals. This includes whole numbers under radicals, fractions under radicals, letters and numbers under radicals.
2. Combining radicals — Adding and subtracting radicals including whole numbers under radicals, fractions, numerical and letter coefficients with radicals. Cubed radicals should be included.
3. Multiplying and dividing radicals—Multiplying includes whole numbers under radicals, fractions, perfect squares, terms under radicals which have to be factored and then combined with coefficients.
4. Division would consist of dividing whole numbers under radicals, fractions, numerical and letter coefficients and both division of perfect and imperfect squares under radicals.
5. Equations containing radicals—This type of equation could contain letters, numbers, or both; binomials and terms with a number, a letter, or both serving as coefficients. Many verbal problems require a radical equation for their solution, and these kinds of problems should be used for purposes of reinforcement.

Unit III Quadratic Equations

1. Incomplete type—This includes formulas from geometry and science involving a variable to the second or third power.
2. Quadratic equations solved by factoring.
3. Quadratic equations solved by completing the square. This type contains equations with the squared term having a coefficient.
4. The quadratic formula

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

5. Graphing quadratic equations, dealing with range set, domain set, parabola, parabolic reflector, focus, axis of symmetry and vertex.
6. Roots of a quadratic equation—when they are real, rational; irrational, equal and unequal, descriptive of the radical sign and discriminant.
7. Finding the sum and product of the roots of a quadratic equation.
8. Forming a quadratic equation if the roots are known. Practice exercises.
9. Verbal problems involving quadratic equations are recommended.

Unit IV The Set of Rational Numbers—An Extension of the Number System

1. Definition of set and all of its aspects namely: Set notation, variable, universal set, finite set, infinite set, null set or empty set, subset, complement disjoint sets, union, intersection, symbols such as $\subset$ contained, $\supset$ contains, ϕ empty set, $\cup$ union, $\cap$ intersection.

2. Natural numbers – definitions, numerals, positive integers. Symbols of grouping such as [ ] brackets, braces, ———— vinculum, ( ) parentheses.

3. Integers—positive and negative. The positive integers are equivalent to the set of natural numbers, but the complete set of integers includes the negative whole numbers and zero.
4. Rational numbers and properties of rational numbers.
5. The use of the number line can be extended so that it serves as a model base for the natural numbers, the integers, and the rational numbers.
6. Special properties of zero: addition, multiplication, multiplication by 0, and multiplication of two numbers equal to 0. Meaningless: division by zero is meaningless.

   Indeterminate: substituting values for letters in numerator and denomniator of fractions to make fraction $\frac{0}{0}$.
7. Decimal representation of rational numbers.

   (a) Every rational number can be expressed as a repeating decimal.
   (b) Every repeating decimal can be expressed as a rational number in fraction form.

Unit V The Set of Real Numbers—An Extension of the Number System

1. Real numbers – broken down into
   (a) Rational numbers — Integers and Fractions
   (b) Irrational numbers — Irrational roots of algebraic equations
   Algebraic Numbers
   (c) Transcendental numbers
2. Modulo arithmetic—addition and multiplication. This type of arithmetic is very helpful in checking the addition and multiplication combinations. Arithmetic and algebraic questions may be solved through this system.

   In the modulo system one deals with the identity element under addition and also the additive inverse and multiplicative inverse. Equations can be solved if the variable and all constants are elements of the same modulo system.

3. Graphing linear equations and inequalities in one variable. It is possible to graph the solution set of a linear equation or a linear inequality in one variable on a number line. This provides an excellent review of fundamental principles useful in algebraic solutions, as well as practice in working with a number line.

4. Absolute value of a real number—One can think of the absolute value of a real number as the number or its opposite, whichever is greater. When used in computation, it is handled as a positive number.

5. Rules for computation are covered in addition, subtraction, multiplication and divison. The absolute value concept has many uses, especally in expressing the rules for computing with signed numbers.

6. Practice is needed in performing all these operations.

MATHEMATICS FIVE

Level V, Phase III

Concepts, Operations, and Procedures for their Development

Unit I Trignometric Ratios, Identities and Functions

Since knowledge of the above topics is necessary for the physics course offered at this level, they are placed in the first unit. It is a difficult but interesting unit and requires much effort on the teacher's part to carefully prepare their material so as to lead the students to discover its fundamental principles and to master them. All available aids should be used—overhead projector, transparencies, slides, posters, etc.

1. Trignometric Ratios:
   1) Ray—defined
   2) Angle—defined
   3) Angle in standard position
   4) Negative and positive angles
   5) Angles from 0° - 360°

6) Six trignometric ratios: sine, cosine, tangent, cosecant, secant and cotangent.

Given a point on the terminal arm of an angle in standard position e.g. (4, 3), the student completes the right angled triangle, finds the length of the hypotenuse (by the Pythagorean theorem), and states the values of each of the six trignometric functions. Much practice is required so that the student becomes thoroughly familiar with these ratios.

2. Identies:

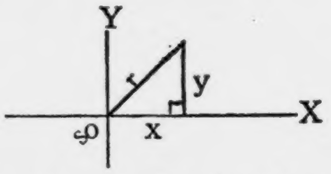
(a) Quotient Relations: $\frac{\sin \Theta}{\cos \Theta} = \tan \Theta$

(b) Reciprocal Relations $\sin \Theta = \frac{1}{\csc \Theta}$

(c) Pythagorean Relations:

$\sin^2 \Theta + \cos^2 \Theta = 1$
$\tan^2 \Theta + 1 = \sec^2 \Theta$
$1 + \cot^2 \Theta = \csc^2 \Theta$

The student develops these relations from the Pythagorean theorem $x^2 + y^2 = r^2$



Assignments should involve practice in using these identities to solve problems.

3. Functions of the special angles — $0^\circ, 90^\circ, 45^\circ, 60^\circ$, and 30°.

Through diagrams, posters or transparencies the teacher leads the student to arrive at

(a) The values of the trignometric functions of these angles.

(b) Functions of angles that terminate in all four quadrants of the co-ordinate plane.

(c) Use of tables to calculate the trignometric function of any angle positive or negative.

4. Solution of rignt angled triangles by means of the trignometric ratios. Stress the importance of these concepts in civil engineering.

5. (a) Graphing the trignometric functions
   $y = \sin x; y = \cos x; y = \tan x$
   (b) Radian measure
   (c) Area of a triangle e. g. $K = \frac{1}{2}$ bc Sin A
   (d) Length of arc of circle $3 = r\Theta$ with Θ measured in radians
   (e) Area of sector of a cirle
   $$A = \frac{r^2\Theta}{2}$$
   (f) Area of segment of circle

With the guidance and direction of the teacher the student develops the above mathematical equations, and uses them to solve problems on land and in space. Ex. Diameter of the moon.

This is a long unit and therefore student evaluation should be carried out periodically by assignments and short tests. The student who successfully masters this unit is well prepared to transfer his knowledge to the study of physics and trignometry offered in the last year of high school and the first year of university.

Unit II Linear Equations

1. Solve linear equations both algebraically and graphically. Students discover the three possibilities using various equations.
   Solutions:
   (a) one point only;
   (b) a straight line (unlimited number);
   (c) no solution.

2. Solution of equations with three variables. Here examples of equations are selected so as to illustrate the variety of solutions possible.
   (a) Planes intersect at **one point only.**
   (b) Planes meet along **a straight line.**

(c) Planes coincide . . . **(plane)**

(d) Planes are parallel . . . **(no solution.)**

By using cards—index, playing, etc.—to represent the planes, the above solutions are readily understood.

3. Linear inequalities is a challenging and interesting topic which the students enjoy. From their graphs they see the many possibilities resulting from problems involving linear inequalities.

a) $x \geqq 0;\ y \geqq 0;\ x + 10y \geqq 10;\ 10x + y \geqq 10$

Solution . . . quadrilateral

b)	$x + y \geqq 6$ and	$x + y \geqq 2$	$x - y \geqq 8$
	$x^2 + y^2 \geqq 25$	$\frac{x^2}{9} + \frac{y^2}{16} \geqq 1$	$x^2 - x - 6 \leqq 0$
Graphs:	Circle and line	ellipse and line	parabola and line

Unit III Exponents

1. Reinforce the basic laws for exponents taught in previous levels.
   (a) Multiplication law: $x^m \cdot x^n = x^{m+n}$
   (b) Division law: $x^m \div x^n = x^{m n}$
   (c) Power law $(a^m)^n = a^{mn}$
   and its variables: $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^n}$
   (d) Zero exponent: $(ab)^m = a^m b^m$
   $a^0 = 1$

2. At this level students do an in-depth study of exponents both positive and negative, integral and fractional. They solve difficult problems whose solution demands the knowledge and skill of a good mathematician.
   (b) Operations:
   1) Simplification: $27^{-2/3}, (-1/8)^{-1/3}$
   2) Using addition and subtraction: $5^0 + 8^{-2/3} + 9^{-1} - 25^{-1/2}$

3. Multimplication demanding the skill to change from radical form to fractional exponents and vice versa.
   Ex. $\sqrt[3]{16} \times \sqrt{3}$

4. Division requires a further step-rationalization. The student developes this skill using both methods – 1) retaining radicals 2) change to fractional exponents.
   $\sqrt{12} \div \sqrt{3}$

5. This unit on exponents is a preparation for the study of logarithms and a mastery of this unit simplifies the operations in which logarithms are used.

UNIT IV Logarithms

1. Exponential form: e.g. $a^x = y$

Logarithmic form: $\log_a y = x$

This procedure is carried out with such numerical bases and powers as 2, 3, 5, . . .

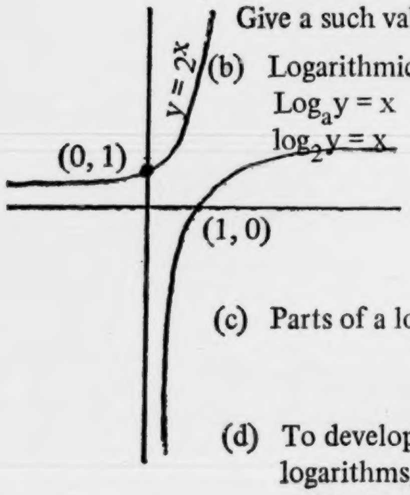
$2^5 = 32$ $\log_2 32 = 5$
$3^5 = 243$ $\log 243_3 = 5$
$10^3 = 1000$ $\log_{10} 1000 = 3$

2. The student recognizes that bases other than 10 may be used to express numbers in logarithmic form. They must realize, however, that the tables used are based on "base 10",

3. Since a logarithm is usually a power or exponent, the laws of exponents apply to logarithms. It is important for the student to see this relationship.

3. Graphs: (A) Exponential Functions

$y = a^x$ $a \neq 0$
and a positive
Give a such values as 2, 10, ½



(b) Logarithmic Function:

$\text{Log}_a y = x$ To graph this function the equation becomes
$\log_2 y = x$ $a^Y = x$ or $2^Y = x$ (where a = 2) – again
$a \neq 0$, and a is positive.

(c) Parts of a logarithm: Characteristic (integral part) may be positive or negative; Montissa (decimal part) always positive.

(d) To develop the skills required for accurate calculations using logarithms, the teacher chooses the simplest method available – The method whereby the student expresses the number in scientific notation.

$\text{Log } 835.8 = \text{Log } (i.385 \times 10^2)$

The exponent 2 becomes the characteristic. From the tables the Mantissa is found.

A similar principle is used to find the number from a logarithm. Interpolation need not be stressed here since it is unnecessary.

(e) Sufficient practice in using multiplication, division, powers, and roots by means of logarithms develops both speed and accuracy. Once mastered the student uses this method for long, involved problems in physics and chemistry in high school and in engineering courses in university.

MATHEMATICS SIX

Level VI, Phase III

Concepts, Operations, and Procedure

Unit I Ratio and Proportion

Content

topics in this phase to make them interesting and challenging. The teacher will be a leader, guide and assistant using a variety of teaching approaches.

The math laboratory utilizing the discovery approach will constitute one of the main means of development. The flexibility that is built into the program allows a student who needs additional drill or background knowledge to successfully master a concept and move to Phase II when such is mastered in a period of one day or one month, or longer. In this way individual differences are accommodated. Other students may wish to pursue the topic in greater detail and so move into Phase V to do independent study, or they may prefer to study the topic further with some guidance and assistance from the teacher in Phase IV. Yet other students may not be able to or wish to go beyond Phase III.

Unit I Ratio and Proportion

3. Equivalent Forms of Ratio and Proportion
4. Theorems on Ratio and Proportion
5. Problems

Unit II Variation

1. Direct variation
2. Graphical representation of direct variation
3. Inverse variation
4. Graphical representation of inverse variation
5. Problems

Unit III Permutations and Combinations

1. Combinations and permutations
2. Permutations using the fundamental theorem
3. The number of permutations of "n", different things taken "r" at a time.
4. The number of permutations of "n", different things taken "r" at a time, if each may be repeated any number of times.
5. The number of permutations of "n" things taken all at a time, if some are alike.
6. The number of combinations of "n" different things taken "r" at a time is the same as the number when taken "n-r" at a time.
7. Problems using $n\overset{C}{\ }r$

Unit IV Inequalities

1. Introduction
2. The relation inequalities
3. Other ordering relations
4. Properties of relations
5. Linear inequalities
6. Graphs of linear inequalities
7. Quadratic inequalities
8. Absolute inequalities
9. Fractional inequalities

10. Simultaneous linear equations
11. Convex polygons
12. Maximum and minimum values of linear functions
13. Linear programming

Unit V Complex Numbers

1. Introduction to complex numbers
2. Addition and multiplication of elements in C
3. Conjugate complex numbers
4. Conventional notation for complex numbers
5. Graphical representation
6. Trigonometric form of complex numbers
7. De Moivre's theorem

Unit VI Theory of Numbers

1. Polynomials
2. The remainder theorem and the factor theorem
3. The fundamental theorem of algebra
4. The rational root theorem
5. Graphs of polynomials
6. Rational functions
7. Graphs of rational functions
8. Explicit algebraic functions
9. Graphs of explicit algebraic functions
10. Additional theorems on polynomials

Unit VII Matrices and Determinants

1. Introduction
2. Operations on matrices
3. Properties of the operation of addition on matrices
4. Multiplication of matrices

5. Cramer's Rule
6. Elementary row operations on matrices

COURSE OUTLINES FOR PHASE FOUR

INTRODUCTION

Phase Four Courses are designed for students of superior ability and achievement in mathematics. There is a considerable similarity between these courses and the courses offered in Phase Three; therefore, the general objectives which were outlined for Phase Three Courses also apply to this particular phase. The major difference lies in the greater depth and complexity in which the concepts and operations can be handled in a shorter period of time. Because of the superior ability and achievement of these students, more challenging work is prescribed for this level, and more of the assignments require independent study or research.

MATHEMATICS ONE

Level I, Phase IV

Concepts, Content, and Procedure for their Development

Unit I Number System

Diagnostic tests should be administered to determine the child's computational skills in whole numbers and fractions. If a child needs additional skill in these operations, he will take these in the appropriate unit in Phase II.

1. Common fractions, decimal fractions and per cent.

   Definitions — natural numbers
   — fractions
   — rational numbers
   — numbers used in arithmetic

2. Properties of numbers — closure
   — commutative
   — negatives
   — zero
   — reciprocal
   — inverse
   — distributive
   — unity

3. Types of systems — natural
— finite
— rational numbers of arithmetic

Students in this phase can handle these concepts and operations in complex forms.

Unit II Sets

1. Intersection, union, contains, is contained in, subsets.
2. Venn Diagrams.
3. Distributivity of intersection over union or vice versa.
4. Cartesian product.
5. Conditions – simple and compound, in one and two variables for equations and inequalities. Use of connective ($\cap$).

Unit III Numeration

1. Research into the history and development of mathematics
   (a) Egyptian
   (b) Roman
   (c) Babylonian.
2. Tally code, grouping and place values.
3. Bases — base 2 and extension of general principles to other bases.
4. An introduction to scientific notation involving positive exponents only.

Unit IV Problem Solving

1. A systematic approach to problem solving, involving universe, condition and solution sets.
2. Simple problems involving simple and compound conditions in one and two variables.
3. Word problems to enable the student to translate from the verbal form to a form in which computational skills take over.
4. Interests of the student should be taken into account when formulating these word problems since the child's interest

in the work is of utmost importance.

5. Use of rate pairs to solve per cent problems.

Unit V Algebraic Skills

1. Complete factoring of natural numbers by use of primer.
2. Finding greatest common factor.
3. Methods of replacement and inverse operations to find a solution set. This may first proceed from a trial and error situation to a more systematic approach to solving simple equations.
4. Use of charts and graphs to find the solution set.
5. Is the empty solution set a possibility and why?

Unit VI Geometry

1. Metric geometry.
2. Angles formed by coplanar lines.
3. Measures of segments and angles.
4. Measures associated with polygons and congruent triangles.
5. Identification of geometric forms such as triangles, quadrilaterals, squares, rhombi, parallelograms.
6. Introduction to the use of geometry instruments such as protractor and compass.

Unit VII Project

In this unit the students should be permitted to undertake an appropriate mathematics project related to this course in consultation with the teacher. This will provide an opportunity for independent work and also will provide an excellent chance for students to learn how to make use of the library facilities. It will enable a student to study in depth a topic that has special interest for him.

MATHEMATICS TWO

Level II, Phase IV

Concepts and Operations	**Procedures**
Unit I —	
Same as in Level II, Phase III, except it is done in more complexity and depth.	The opportunity should be taken to correlate this unit with work in science using the metric system.
Unit II —	
Same as in Level II, Phase III, with the addition of the Metric System.	The following constructions which are done with compass and straight edge, are recommended:
Unit III — Geometry	
a. Construction	1) Draw a segment equal to a given segment. 2) Draw an angle equal to a given angle. 3) Bisect a given segment. 4) Bisect a given angle. 5) Draw a line perpendicular to a given line through a point on the line. 6) Draw a line perpendicular to a given line through a point not on the line. 7) Draw a line parallel to a given line through a given point.
b. Parallel lines	
c. Angles	Many of the constructions outlined for Level Three Math in Phase III may be adapted for this course.
d. Quadrilaterals	
Unit IV—Number Sentences	The student should get practice in dealing with letters. An introduction to algebra invol-

ves developing a knowledge of and an ability to use:

1) Negations
2) Inequalities
3) Number phrases
4) Simplifying phrases
5) Solving equations
6) Conditional sentences
7) Converses

Unit V —

System of rational numbers same as in Unit IV in Level II, Phase III, except it is done in more complexity and depth.

Unit VI —

Solving equations

The additive and multiplicative inverse, zero product. A systematic approach to solving equations should be stressed.

Unit VII —

Geometry (formulas and applications). Not only is the work prescribed for this level and phase to be done in greater complexity and depth, but the procedures for developing the outlined concepts and operations should involve the utilization of the discovery approach.

MATHEMATICS THREE

Level III, Phase IV

This course is a logical extension of the one offered in Level III, Phase III. The units outlined for Level III Phase III should be developed in greater depth and complexity through the use of more difficult exercises, verbal problems, and the transfer of knowledge to associated disciplines. In addition to the units outlined for Phase III, the following units are suggested.

Unit V

Relations, Functions, and Variation

1. The meaning of relation (a) ordered pairs of numbers	1. Exercises utilizing: (a) Number pairs in which the pairs are listed. Ex: Assigning students to their seats in the classroom. (b) Mathematical formulae (c) A table. (d) A graph.
2. The terminology relating to a graph-domain, range, independent variable, and dependent variable.	2. Demonstration and practice in labelling the axis is needed.
3. The meaning of function.	3. Exercises are needed to demonstrate the difference between function and relation.
4. Understanding the coordinate system (a) Origin (b) Abscissa (c) Ordinate (d) Coordinates of the	4. Graphing exercises are recommended and a review of the number line is needed.

point (e) Quadrants	
5. Graphing a linear function. (a) Getting the slope. (b) Determining the slope—intercept form of the equation.	5. Practice is needed.
6. Practice is needed.	6. Graphing inequalities. (a) Open half-plane (b) Closed half-plane
7. The meaning of ratio and proportion.	7. Many practical examples drawn from the pupils' experiences should be used.
8. The meaning of direct variation.	8 Reading values from graphs is recommended.
Unit VI	
Systems of Linear Equations	
1. The graphing of linear equations.	1. A review is called for in order to develop the understanding that the solutions to the equation found on the graph are not accurate.
2. The meaning of systems of linear equations.	2. Demonstration is needed.
3. The addition method of solving systems of linear equations.	3. Practice exercises are required.
4. Solving linear equations by substituting.	4. Practice exercises are required.
5. Applications of systems of linear equations.	5. Problem exercises are recommended.

MATHEMATICS FOUR

Level IV, Phase IV

Concepts, Operations and their Development

Unit I

1. Operations with Polynomials
   - (a) Evaluating algebraic expressions
   - (b) Addition and subtraction of polynomials
   - (c) Law of exponents
   - (d) Division of polynomials
   - (e) Synthetic division
2. Special Products
   - (a) Difference of two squares
   - (b) Square of a binomial
   - (c) Square of a trinomial
   - (d) Cube of a binomial
3. Factoring algebraic expressions whether the exponent is odd or even and according to the sign between the terms
   - (a) Simplifying algebraic fractions
   - (b) Adding algebraic fractions
   - (c) Multiplication of fractions
   - (d) Division of fractions
   - (e) Complex fractions

Unit II Relations and Functions

1. This involves the development of clear and concise definitions and a thorough understanding of the application of the definitions to the following situations:
   - (a) ordered pairs
   - (b) relation
   - (c) variable
   - (d) independent variable
   - (e) domain set
   - (f) range set
   - (g) ways of stating a relation
   - (h) parameter

2. The meaning of function
    (a) Functional notation — The use of precise symbols is recommended to make it possible to study complicated relations more easily. Use of tables, linear equations, and fractional equations is necessary.
    (b) Inverse fractions — Obtaining a set of ordered pairs by interchanging elements of all ordered pairs of a relation.
    (c) Graphical representation of ordered pairs — This involves a coordinate system, a coordinate plane or x-y plane, origin, quadrants of a graph, terms pertaining to a graph such as abscissa, ordinate and coordinate.
    (d) Graphing relations that are functions. This may be done with a finite number of ordered pairs and with an infinite set of ordered pairs.
3. Linear functions
    (a) Polynomials of first degree such as $2x + 3$. Equations in one variable fall into two general classifications: 1) identity 2) a conditional equation—one not true for all replacements of the variable.
    (b) Theorems for solving equations: Addition theorem, subtraction theorem, multiplication theorem, division theorem.
    (c) In order to facilitate an understanding of functions, the following terms must be thoroughly understood: equivalent equation, extraneous roots, redundant equation, defective equation.
    (d) Verbal problems involving linear equations—This type of problem may be difficult to understand when applying algebra to practical problems. Many examples and a systematic approach are the usual pedegogical methods.
    (e) Graph of a linear function—If any two points are selected on a graph line, the slope is the rise divided by the run.

(f) Slope – Intercept form for the Equation of a Line – The equation $y + mx + b^Y$ is called the slope-intercept form of the equation of a line. m refers to the slope, y the intercept. Other types of lines are: Families of lines, Parallel and perpendicular lines.

(g) The distance between two points measured in graph units is found by use of the following formula $(P_1P_2) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

(h) For finding the coordinates of the midpoint of a line segment the following formula must be known:

$$(x,y) = \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}$$

(i) When solving conditional inequalities the following principles must be known: 1) addition, 2) multiplication for positive multipliers, 3) multiplication for negative multipliers, 4) transitive principle.

Unit III

A project of considerable magnitude involving independent study and research on any aspect of the concepts or operations outlined for the two previous units should be developed. The project should be individualized to accommodate particular student's needs and interests.

MATHEMATICS FIVE

Level V, Phase IV

The development of this course outline was intentionally omitted because the Curriculum Branch of the Provincial Department of Education is currently working on a new curriculum outline for grade eleven academic geometry which will be accompanied by a new text. The group felt that they wished to wait for the opportunity to review the new outline and, if possible, adapt it for purposes of utilization in this phase and level.

ADVANCED MATHEMATICS SIX

Level VI, Phase IV

Unit I Pre-calculus

Concepts

(a) The real number system

- (b) Complex number system
- (c) Inequalities
- (d) Functions
- (e) Determinants and matrices
- (f) Vectors
- (g) Limits
- (h) Logic

Unit II —Mathematical problems relating to

- (a) Linear programming
- (b) Modular arithmetic
- (c) Counting and probability
- (d) Determinants
- (e) Topology
- (f) The language cable

The Nature of the Mathematics Prescription for Phase Five

Phase Five is reserved for the few students of outstanding mathematical ability and achievement who have a special interest in mathematics and who are capable of a high degree of self direction. It would defeat the purpose of this phase to outline specific courses for it. It is recommended that a separate program be worked out for each student through consultation with a staff advisor who has an excellent background in mathematics. A student's interests and career plans should play a major part in determining the nature of his assignment. A program of this nature should enable the school to identify prospective mathematicians.

These students, because of their willingness to assume responsibility for their own learning, should be allowed to determine how they will use the school time allotted for their study, apart from that specifically set aside for consultation. The effective utilization of this time will require the availability of a variety of worthwhile source materials in the forms of manipulative materials and equipment, programmed materials, charts, games, puzzles, and reference books. Those students who fail to assume responsibility for the self direction expected of them should be transferred to another phase in which the work is challenging but the learning experiences are more structured.

PROCEDURE

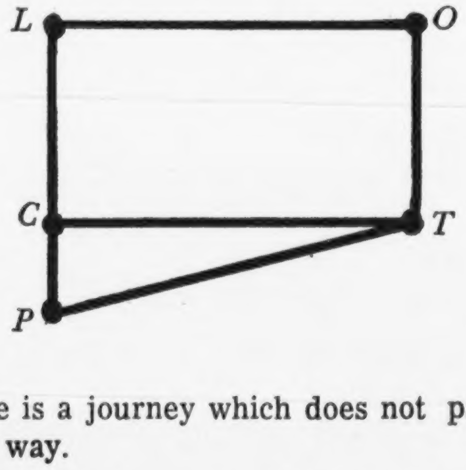
This course is designed to lead students on to wider horizons in mathematics and to "stretch" their minds through challenging and satisfying learning experiences involving the discovery approach. Because of their academic background and their giftedness in the area of mathematics, these students should be encouraged to do a great deal of their work in small groups and on an independent basis. Content should be chosen largely on the basis of student need and interest. In the latter part of the year students should be encouraged to develop a project in depth relating to one of the designated mathematical problems. The role of the teacher is to guide, to challenge, and to assist.

THE DEVELOPMENT OF THE CONCEPT OF MATRICES: A MODEL

Level VI: Phase 3, Lesson Directed by the Teacher

Theme: Introduction to Linear Algebra
Concept: Matrices

Aim: To develop a two dimensional matrix.
Previous Knowledge of Students: None



Introduction:

A direct route is a journey which does not pass through another town on the way.

Is there a direct route from (1) C to L? (2) C to O? (3) C to C?
How many direct routes go to T?

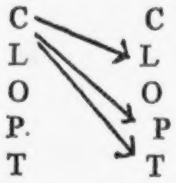
How many start at L?
One way of describing the direct routes linking the towns is to draw a map as above. Can you suggest others?

1) Make a list.
From T to O
C to L

L to C
C to P

How many direct routes?

2) Arrow diagram.



(Concept being learned; mapping)

How about this?

3) Make a table

	C	L	O	P	T
C	0	1	0	1	1
L	1				
O					
P			etc.		
T					

A table which shows the number of routes between towns, etc. (arc between nodes) is called a route matrix.

(Teacher may now wish to give a few more similar problems.)

Level VI: Phase 4

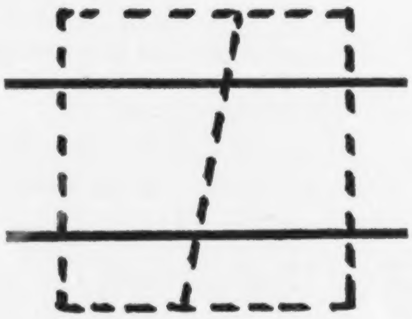
Theme: Introduction to Linear Algebra

Concept: Matrices
Topic: Parallel Lines
Aim: To develop a three dimensional matrix.

Draw two parallel lines on a piece of paper (overhead projector is better if each student doesn't have the needed material).

Draw a line on a piece of acetate sheet.

Place the acetate sheet over the paper like this:



An angle is marked; the children will intuitively recognize equal angles.

Can you find another like it? Another? And so on.

Are any of the angles you have chosen different in any way? Sometimes during this activity there will probably be a need to label the angles. All the equal angles may be described in the children's words or in more conventional terms like: vertically opposite, opposite, corresponding and alternate. If the language is understood, on a new diagram mark one of the angles. Use symbols V: certically opposite, C: corresponding and A: alternate.

Starting at this angle where will I go if I say V?
Where will I go if I say C? A?

What happens if I do A and then C? VCA? VAC? and so on.

The students can make a speed game of this with each other without touching the diagram. Starting at the same angle:

If I do C and then V, where am I?
How could I have got there in one move?
Try VA. What single move now?

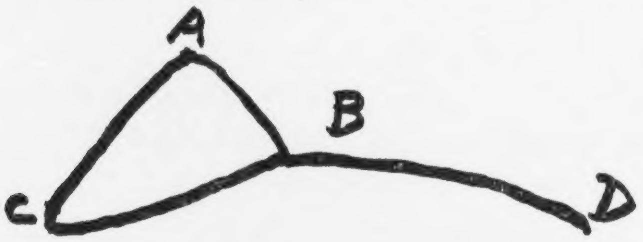
Now a "Do Nothing" or "Identity" operation is obvious. Results can at first be written at random, e.g. CV = A, VA = C, VV = 1, etc. A table of all the possible results gives an opportunity to observe and discuss the structure of the system involved.

Level VI: Phase 5

Theme: Introduction to Linear Algebra
Concept: Matrices

Aim: To develop a four dimensional matrix.
Introduction:

The following network may be drawn on a sheet of paper and given to each student or on the blackboard or overhead projector. The pupils are asked to describe the network in their own words.



Development:

A) Several pupils will be asked to read out their descriptions and the teacher will draw their networks exactly as they are read out. It is hoped that there will be several discrepancies so that it can be pointed out that words alone are really insufficient to give an accurate description, unless the descriptions are extremely long.

B) The following matrix will be written on the blackboard or shown on the overhead projector and the class told that it is the teacher's description of the network.

Matrix - Pl. matrices

$$\begin{array}{c|cccc} & A & B & C & D \\ \hline A & 0 & 1 & 1 & 0 \\ B & 1 & 0 & 1 & 1 \\ C & 1 & 1 & 0 & 0 \\ D & 0 & 1 & 0 & 0 \end{array}$$

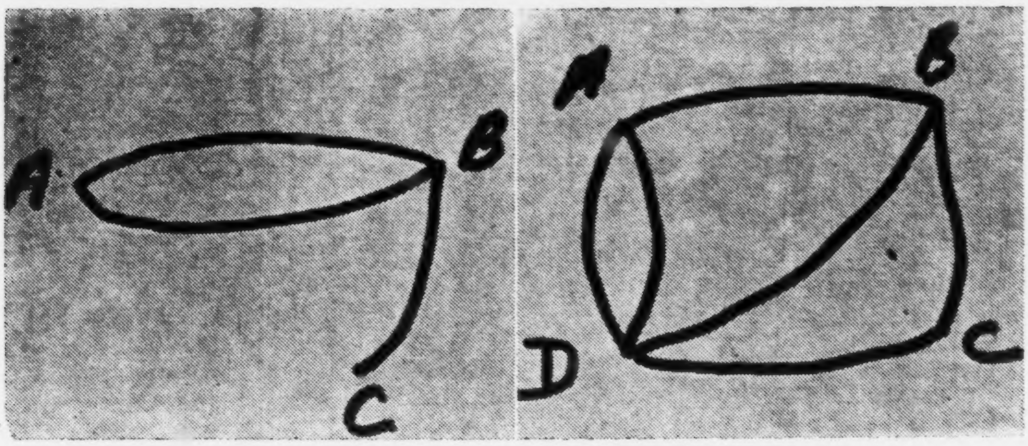
$$\begin{array}{c|cccc} & 1 & V & A & C\ \text{(2nd)} \\ \hline 1 & . & . & . & . \\ V & . & 1 & C & A \\ A & . & C & . & V \\ C & . & A & V & . \end{array}$$

Discussion:

Conclusions: (Written or given orally by the students.)

C) Another network will be drawn and the pupils asked to make up its matrix. No help will be given as to what the matrix means. For those pupils who make up a correct matrix these two networks will be given to them.

D) Pupils are asked to write up their descriptions of the original network and to explain in their own words what they think the numbers in the matrix represent.



The student now has the background needed to study matrices on an independent basis. At this point he should be able to define those aspects of matrices on which he wishes to work and to assist in developing a procedure for his study.

Chapter IX

A NONGRADED SCIENCE PROGRAM
for the
SENIOR HIGH SCHOOL

Introduction

> In 1847 the epochal Quincy School was built in Boston. For a century to come it set the design of American schools. It sorted the children into grades, and every grade had its own private meeting place—a classroom—where the teacher and fifty-five children of about the same age sat together for a solid year. This schoolhouse consisted of twelve rooms, each the same as the next, four to a floor piled one atop the other for three floors.
>
> For a hundred years after 1847, the pattern of separate and equal boxes set by the Qlincy School remained essentially unbroken.[1]

The Quincy School, in Boston, did indeed fit its students into convenient slots with age being the major criterion. But, are we not, in 1970, at a time when the world's supply of knowledge is doubling every ten years, doing the same? Are we not fitting students into our own "slots" by using the graded structure as our criterion?

Like most high school graduates, I have gone through a graded structure and remember many pleasant things but also some frustration. During my Education year at St. Francis Xavier University the idea of nongrading was presented to us. Perhaps we were not thoroughly convinced of its value, but, in the months I have been teaching, I have come to see a real need for some alternative.

In this paper my aim will be to give an overview of a nongraded science curriculum for a senior high school which could be implemented in schools in this area. This will include a presentation of reasons for establishing such a program, objectives for a senior science program, the organization of the science curriculum, different instructional approaches, materials useful in implementing such

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Laboratories, p. 4.

[1] "The Things of Education," A Second Report From **Educational Facilities**

a program, the physical "setting" most suitable for the teaching of science, and suggested evaluation procedures.

Why Study Science?

Perhaps one of the best definitions of science is the one formulated by the Science Manpower Project:

> Science is a cumulative and endless series of empirical observations which result in the formulation of concepts and theories, with both concepts and theories being subject to modifications in the light of further empirical observations. Science is both a body of knowledge and the process of acquiring and refining knowledge.[2]

In this age of advanced technology, when the United States is sending men to the moon, it is more important than ever that all students receive a chance to become aware of the methods and processes of science. The general education objectives listed below may be used to show ways in which the study of science is beneficial to students:[3]

1. Helping young people fit themselves into their society:—Science gives students an opportunity to work in both small and large groups, in school and out of school, with students whose interests are similar to theirs and with those whose interests are different.

2. Maintaining physical health and well-being:—The scientific approach to the care of the human body is more effective than parental indoctrination. For example, if a child is able to see why he must be careful at a crosswalk or why certain foods do not make an acceptable diet, he will decide on his own how he must act.

3. Helping students with personal adjustment:—Adolescence is a difficult time for boys and girls. Because of the nature of the science program, a teacher is able to observe the students under different conditions and thereby ascertain their strengths and problems.

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[2] Frederick Fitzpatrick (ed.), **Policies For Science Education,** New York, Bureau of Publications, Teachers College, Columbia University, 1960.

[3] Walter A. Thurber, Alfred T. Collette, **Teaching Science in Today's Secondary Schools,** Boston, Allyn & Bacon Inc., 1969, p. 53.

4. Helping students appraise themselves realistically:—Some students feel they are a complete failure because they do not achieve academically. Science gives students a greater opportunity to discover talents they might not know they possessed.

5. Encouraging independent thinking:—In studying science a student is given the opportunity to conduct experiments, make observations, obtain results, recheck them, if necessary, and then, in view of his knowledge of science, come to a logical conclusion on his own.

6. Giving students exploratory experiences:—In certain subjects students hesitate to undertake some tasks because they fear they may fail. A science student is given the opportunity to determine his own strengths and limitations. He may determine what he would like as his life occupation or some activity he may like as a hobby.

7. Helping students meet the problems of everyday living:—Science may be of more help to a student in everyday life than any other subject. It helps to explain the physical world around him and the biological life within him.

8. Preparation for later experiences of life:—In school few students stop to think that any course they are now taking will be of help later on in life. The relationship of science to the immediate needs of the student as well as to distant ones can be made readily apparent. The study of science, therefore, is beneficial to the immediate as well as the distant needs of the student in that it helps to explain a great deal about the world in which he lives.

Broad Objectives of the Science Program

Science education should be based on the skills of inquiry that lead to an understanding of scientific concepts rather than on the accumulation of facts. The broad objectives of this science program were formulated with this in mind and seek:

1. To develop an understanding of science concepts that will enable students to become scientifically literate in describing problems around them.

2. To develop the kind of curiousity that leads to a desire for more discoveries and thereby promote discovery as a lifelong process.

3. To develop an understanding of the place of science and research in modern society.

4. To develop an understanding of and an ability to apply basic scientific principles.

5. To develop an understanding of the relationship between science and other areas of the curriculum.

6. To develop self expression and descriptive techniques.

7. To develop the ability to think critically about the situations and problems that arise in daily living.

8. To develop the skills of scientific inquiry needed to gain and apply scientific knowledge.

The Skills of Science

One of the basic premises of a good science program, as previously indicated, is that it should be based on the skills of inquiry rather than on the accumulation of facts. Since science programs in the past were so factually oriented, an elaboration of the basic skills of scientific inquiry may help the science teacher reorient his program to achieve more worthy objectives. These skills may be outlined as follows:[4]

1. **Observation.** Students observe objects and phenomena in their environment. Measurements are made. With young children this is comparative measurement. Later on qualitative observations can be made.

2. **Description.** Students must learn to describe what they have observed and to express these observations in speaking and writing. They become more skilled as they learn to sharpen their observations and describe them in greater detail.

3. **Comparison.** Comparisons are made as to similarities and differences, based on observations.

4. **Categorization.** Students learn to place objects and phenomena into categories. Those alike are placed together; different ones are separated.

5. **Analysis of Relationships.** Students recognize relationships between categories and analyze these relationships. Relationships are analyzed for both quantity and quality.

6. **Classification of Relationships.** Students classify objects and phenomena on the basis of an analysis of existing relationships. Only important relationships are stressed.

7. **Postulation and Theorization.** Students are given the opportunity to presuppose tentative answers on the basis of accumulated information. When students have accumulated data based on observations and examine this data, conclusions may be drawn. If observations are adequate, the presupposed answers can be tested; if not, more observations must be made.

8. **Hypothesization.** Students draw up a tentative answer or a statement to account for all data concerned. This statement which may be called a theory or generalization is used in new situations and may be proved entirely wrong.

9. **Verification.** Students use new information to check the hypothesis to see if it is valid.

10. **Experimentation.** Students experiment to verify their hypotheses. They may design and conduct their own experiments. Careful attention must be given to the control of variables.

11. **Probability Determination.** There are no absolutes in science, and the merits of an answer should be considered in terms of relative truth.

These skills should run spirally through the science program from elementary to senior high school. In elementary school observation, description, comparison, categorization, analysis of relationships and classification of relationships are stressed while the other skills are given minor consideration. In junior and senior high school the skills which require application are stressed. These skills are postulation and theorization, hypothesization, verification, experimentation and probability determination.

The degree to which a student learns a skill depends on his background, ability and interest in science as well as on sequential practice. A student with high interest and high ability will be able to devise a sophisticated experiment with a limited amount of practice. With the slower students nothing can be taken for granted.

Approaches to Teaching Science

> The science teacher gets his job done only by what he induces, motivates, cajoles, implies, forces, or challenges his students to do, and to do in such a way that they learn.

> The misuse or overuse of certain methods is one of the hazards that students have to face. The skillful teacher will have many offerings in his repertoire.[5]

The skillful science teacher uses a variety of methods, depending on what he wants to accomplish. A brief consideration of the relative strengths and weaknesses of various teaching methods is in order.

The lecture method was the one most often used by science teachers in the past. It allowed the teacher to cover large amounts of material in a single class period without the aid of a variety of books and lab equipment. Courses taught completely by the lecture method do not accomplish the objectives of a worthy science program because the student merely sits, takes notes, and in exams gives the information back to the teacher.

Oral questioning, while not a separate method, is very useful in enhancing the effectiveness of many methods. It is especially helpful in finding out what students already know about the topic and for review purposes. This method, cleverly used, is the heart or core of inductive teaching. Its clever utilization can encourage the highest level of thinking.

Classroom discussions are useful in handling controversial issues. The student should first know something about the subject which they are to discuss. This method should prove to be particularly useful in handling value issues relating to science.

The problem solving approach probably provides the best method of teaching science. It is dependent upon both inductive and deductive reasoning. Students' in learning to solve science problems, learn how to apply knowledge to new situations.

The project method may be used to provide for the needs of individuals or for small groups of students. The student is usually permitted to take part in choosing his own project in consultation with a staff advisor. The trend in high school teaching has been to have more projects since these help the student learn the attitudes and difficulties scientists encounter in the process of solving problems. The project is particularly useful as a vehicle of independent study.

TABLE 1

PUPIL CHARACTERISTICS WHICH SERVE AS A GUIDELINE FOR PLACEMENT

PHASE 1	PHASE 2	PHASE 3
I.Q. less than 90 Adjusted Very weak science background Not able to work on theory but able to do lab-centered course with much direction	I.Q. not specified Remedial Have a low interest in science Difficulty in a specific area Much individual attention required on basic skills	I.Q. 90 - 110 Average student Good science background Average interest in science Able to follow courses which include theory Mathematical ability adequate
PHASE 4	**PHASE 5**	
I.Q. 110 - 130 Above average student Very good science background High interest in science Good Mathematical ability	I.Q. above 130 Exceptional student Superior science background High interest in science as a future career High motivation for self direction Mathematical ability of college bound student	

Many things can be taught best in the laboratory atmosphere. For example, it is difficult to teach a student how to bend glass unless he actually does it. Students should begin with experiments of the cook-book type to become familiar with apparatus and then should be given the opportunity to conduct open-ended experiments with minimal teacher direction. Gradually, students will suggest experiments of their own. Field trips are a special kind of laboratory situation, and are best suited to biology and geology courses. On these trips the students may ask questions, collect specimens, or "observe science in action". These are especially important for students interested in a career in science.

Within the last few years audio-visual aids have become more prominent in the teaching of science. Charts, maps, posters, bulletin boards, motion pictures, T. V., filmstrips, slides, models, microprojectors, overhead projectors, magnifying instruments and photographs help the teacher to provide meaningful learning experiences. The utilization of these aids will enhance the effectiveness of any method. The more aids a teacher has, the easier it will be for him to structure learning situations which involve a high degree of student activity.

The Nature of the Student Body and Its Implications for Placement

The student body of a large high school will usually consist of a normal distribution of pupils. All variations of ability, achievment, interests, and aspirations should be represented. At the beginning of the year all students should be given the **Kuder General Interest Survey Form C Grades 6 - 12 and the Lorge-Thorndike Intelligence Test Grades 10 - 12.** The **Kuder General Interest Survey** is suggested because it gives scores in eleven areas of interest: outdoor, mechanical, literary, scientific, computational, musical, social, social service, persuasive, artistic, clerical and verification. The **Lorge-Thorndike Intelligence Test Level C** is suggested since it gives both a verbal and a non-verbal score. This test deals with:[6] a) abstract and general concepts; b) interpretation and use of symbols; c) relationships among concepts and symbols; d) flexibility in the organization of concepts and symbols; e) utilizing one's experience in new patterns and f) utilizing "power" rather than speed in working with abstract materials. These tests give an I. Q. score with a mean I. Q. score of 100 and a standard deviation of 16 I. Q. points.

The above tests are suggested rather than science tests since most science tests deal with a specific branch of science, and four such tests would have to be administered. The general science tests investigated stress fact rather than understanding and application of knowledge.

The student body varies, as already stated, from very slow students to very clever ones. These students should be placed in levels and at phases within these levels which suit both their intellectual needs and their personal ambitions. The placement of these students should depend not only on the scores obtained on I. Q. and interest tests but also on past academic achievement, teacher recommendation, and student preference. A recommended guideline for placement procedure is given in Table 1.

The Science Curriculum

This section presents a proposed science curriculum for a nongraded senior high school containing 740 students who are to be placed appropriately in a science program organized into five phases. The overall science curriculum and the proposed number of students per level, phase and class is presented in tabular form. The basic subjects that should be offered in a secondary science program are indicated by phase and level. Course summaries are presented outlining briefly the purpose of the course, the basic content to be stressed, and an indication of whether or not the Nova Scotia Department of Education provides the required textbooks.

Table II presents the allocation of pupils in the science program by level, phase, and class. This allocation is based on the assumption that the study body of this school represent a normal distribution of ability and achievement. A change in distribution is recommended if it is suggested by test results and/or teacher assessment.

Table III presents the allocation of subjects by phase and levels. The course descriptions that follow indicate that many worthwhile science courses are currently available in our science program; however, their grade or year allocation has not always been made on a rational basis. The introduction of chemistry, physics, and geology at an earlier level than is currently suggested in our Nova Scotia Program of Studies enables students who have the ability and interest to study one or more sciences in greater depth than was possible in the past. The realistic accommodation of these courses to the ability and achievement of the students is facilitated by their multiphased offering.

TABLE II

PROPOSED ENROLMENT BY LEVEL, PHASE, AND CLASS *

Level	Phase	No. Students	No per Class	Phase	No. Students	No per Class
4	1	20	20	2	40	20
5	–	–	–	2	40	20
6	–	–	–	2	40	20
4	3	180	30	4	25	25
5	3	150	30	4	25	25
6	3	120	30	4	25	25
4	5	25	25			
5	5	25	25			
6	5	25	25			

* This is for a senior high school of 740 students.

TABLE III

OVERALL SCIENCE CURRICULUM

Level	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
4*	General Science	Biology	Physical Science Math for Science Students	Physical Science Math for Science Students	Chemistry Biology Physics Geology Math for Science Students
5	–	Geology	Chemistry Biology Geology	Chemistry Biology Geology Physics	Chemistry Biology Geology Physics
6	–	Physical Science	Chemistry Biology Geology	Chemistry Biology Geology Physics	Chemistry Biology Geology Physics

* Upon the completion of Level 4 general science, students in phase one may opt either to enter vocational courses or to attempt the science program offered in phase 2, depending upon their interests and achievement.

TABLE IV

COURSE OFFERINGS FOR HIGH SCHOOL SCIENCE PROGRAM

Level 4	Phase 1 – General Science
	Phase 2 – Biology
	Phase 3 – Physical Science + Introductory Math for Science Students
	Phase 4 – Physical Science + Introductory Math For Science Students
	Phase 5 – Two of Chemistry, Biology, Physics, Geology + Introductory Math For Science Students
Level 5	Phase 1 –
	Phase 2 – Geology
	Phase 3 – Two of Chemistry, Biology, Geology
	Phase 4 – Two of Chemistry, Biology, Geology, Physics
	Phase 5 – Two of Chemistry, Biology, Geology, Physics preferably the two chosen in level 4 phase 5
Level 6	Phase 1 –
	Phase 2 – Physical Science
	Phase 3 – Two of Chemistry, Biology, Geology
	Phase 4 – Two of Chemistry, Biology, Geology, Physics
	Phase 5 – Two of Chemistry, Biology, Geology, Physics

Level 4 Phase 1

At this level and phase students are now in the last year of what is at present an adjusted science program. It is suggested that these students be given a practical general science course which is laboratory-oriented. Since this course is designed to be the last one in which formal theoretical science will be presented to these students, it should emphasize basic concepts of life, earth, and physical science which will enable them to gain an understanding of the environment in which they live.

Level 4 Phase 2

Biology — (Texts supplied by Nova Scotia Department of Education)

Materials: Fitzpatrick, Frederick L., **Living Things**, New York, Holt, Rinehart & Winston Inc., 1966.

Purpose: To give a thorough and up-to-date view of the science of biology in a simple and nontechnical form.

Course: This course gives students a background in biology without too much emphasis on facts and is so constructed that students will be able to relate it to their own personal family and community. The basic topics which should be stressed in this course are: Principles of Biology; the Continuation of Life; Living Things in the Environment; Classification and Primitive Life; the Plant Kingdom; the Animal Kingdom; Human Biology.

Level 4 Phase 3

Physical Science — (Texts not offered by N. S. Department of Education)

Materials: **IPS Introductory Physical Science,** IPS Group Educational Services Incorporated, New Jersey, Prentice Hall, Inc., 1967.

Purpose: To give students a beginning knowledge of physical science and to offer some insight into the means by which scientific knowledge is acquired; to serve as a foundation for those who take later courses in physics, chemistry or biology and also for those who take no other science in high school.

Course: This course helps students who later take a PCCS, CBA, or CHEM Study course because it gives them an understanding of the nature of experimental physical science and gives them basic scientific skills required in these courses. Concepts to be stressed are: Quantity of Matter, Mass, Characteristic Properties, Solubility and Solvents, the Separation of Substances, Compounds and Elements, Radio-activity, the Atomic Model of Matter, Sizes and Masses of Atoms and Molecules, Molecular Motion, Heat.

Level 4 Phase 3

Mathematics For Science Students — (No text prescribed by the N. S. Department of Education)

Materials: Units prepared by the teacher
Slide Rules

Equipment to show measurement

Purpose: To give students the basic mathematics required in physics and chemistry.

Course: Basic concepts and operations to be stressed are:

— Basic math operations +, -, x, division.
— Scientific Notation.
— Significant Figures.
— Measurement using English and Metric systems.
— Trignometric functions.
— Use of the slide rule.
— Logarithms.

Level 4 Phase 4

Physical Science

Materials: See level 4 phase 3

Purpose: See level 4 phase 3

Course: This course is similar to that offered in level 4 phase 3 because the same concepts are to be developed spirally in greater depth.

Level 4 Phase 4

Mathematics For Science Students

Materials: See level 4 phase 3

Purpose: See level 4 phase 3

Course: This course involves a deeper consideration in a spiral order of the basic concepts and operations laid out in level 4 phase 3.

Level 4 Phase 5

Chemistry — CHEM Study — (Materials are available from the N. S. Department of Education, if a teacher who has taken a summer school in the course is available to teach the course.)

Materials: Chemical Education Materials Study Committee, **Chemistry, An Experimental Science,** San Francisco, W.H. Freeman & Co., 1967.

Maln, Lloyd E., **Chemistry An Experimental Science: Laboratory Manual,** San Francisco, W. H. Freeman & Co., 1967.

Purpose: To develop an understanding of basic concepts, theories and ideas in Chemistry.

Course:

Emphasis on the structure of a chemical system includes the electron structure, the geometrical arrangement of the atoms, their relative sizes and shapes, the packing together of atoms and molecules, the forces between them, and how these affect their chemistry. This knowledge will help to guide the student in his understanding and interpretation of the complex chemical phenomena.

The text material begins with an overview of the field of chemistry. Gradually, the student is introduced to major generalizations including energy and chemical reaction, rates of chemical reaction, equilibrium and chemical reaction, stochiometry, atoms and their structure, periodicity of chemical properties, and electron structure. After the generalizations have been developed through through experimentation, the students are expected to continue using what they have learned in interpretating and understanding more complex ideas.[7]

Level 4 Phase 5

Physics — PSSC Physics — (Materials are available from the N. S. Department of Education, if a teacher who has taken a summer school in the course is available to teach the course.)

Materials: **Physics Physical Science Study Committee,** Montreal, The Copp Clark Publishing Co., 1965.

PSSC Laboratory Manual

Purpose: To develop an understanding of the basic structure of physics.

Course:

> The content of the PSSC course has been chosen, not simply to cover physics, but to display the structure of the field. The course is not as broad as some topically, but the topics that have been selected are explored more fully than in other beginning courses. The pattern evolved in the course is one in which central ideas recur, each time to be carried further in a higher synthesis of ideas. It is a pattern which, as an alternative to authoritative assertion of principles followed by illustration or example, works from phenomena to theory. The frequent analysis of experiments in the text and films and the carefully integrated laboratory work strive to give meaning to physical law and theories and an understanding of how they are formulated.[8]

The basic themes suggested at this level are: The Universe and Mechanics.

Level 4 Phase 5

Biology — BSCS Biology Blue Version — (These texts are not available from the N. S. Department of Education.)

Materials: BSCS Study Curriculum, **BSCS Blue Version High School Biology,** Chicago, Rand McNally & Co., 1966.

BSCS Blue Version Laboratory and Field Investigation

Purpose: To develop an understanding of the major contributions modern, molecular biology has made to the general understanding of scientific problems; to illustrate to the students the nature of science as well as its products.

Course: For some students this could be the last course in science education. It is, therefore, important that the students be able to evaluate science. In this course the major themes or ideas to be stressed are: Biology, the Interaction of Facts and Ideas; the Evolution of the Cell; the Multicellular Organism; New Problems of Life; the Multicellular Organism: Problems of Reproduction and Variation; the Multicellular Organism: Problems of Energy Utilization; the Multicellular Organism: Problems of Integration; Higher Levels of Investigation.

Level 4 Phase 5

Geology — (These texts are available from the N. S. Department of Education.)

Materials: See level 5 phase 2

Purpose: See level 5 phase 2

Course: The following topics could also be included in this phase in addition to those suggested in level 5 phase 2: the Record of Earth History; the Earth's Envelope of Water; the Earth's Atmosphere.

Level 4 Phase 5

Mathematics For Science Students

Materials: See level 4 phase 3

Purpose: See level 4 phase 3

Course: The basic concepts and operations outlined in level 4 phase 3 are to be studied in greater depth and applied to more complex science problems.

Level 5 Phase 2

Geology — (These texts are available from the N. S. Department of Education.)

Materials: Ramsey, William L., and Burckley, Raymond A.,

Modern Earth Science, New York, Holt, Rinehart & Winston, Inc., 1965.

Floch, Henri J., **Exercises & Investigations Modern Earth Science,** New York, Holt, Rinehart & Winston, Inc., 1965.

Purpose: To develop a basic understanding of their home planet and its position in the universe.

Course: In this course the student first establishes the position of the earth in the universe; the earth is then considered as a planet, and the surface of the earth and the factors which took part in its formation are emphasized. Suggested units are: the Earth in the Universe; the Earth and its Motions; the Materials of the Earth's Surface; the Factors That Shape the Earth's Surface.

Level 5 Phase 3

Chemistry — (These texts are available from the N. S. Department of Education.)

Materials: Metcalfe, Clark H., **et al, Modern Chemistry,** Toronto, Holt, Rinehart & Winston, Inc., 1966.

Metcalfe, Clark H., **et al, Laboratory Experiments in Chemistry,** Toronto, Holt, Rinehart & Winston, Inc., 1962.

Purpose: To enable students to study chemistry in a modern theoretical framework.

Course: The basic concepts or ideas to be stressed in this course may be outlined as follows: the Science of Chemistry; Matter and its Changes; Atomic Structure; Electron Configuration of Atoms; the Periodic Law; Chemical Bonds; Chemical Composition; Chemical Equations; Molecular Composition of Gases; Liquids, Solids, Water; Solution Process; Ionization; Acids, Bases and Salts; Suspensions.

Level 5 Phase 3

Biology — (These texts are available from the N. S. Department of Education for the year 1970-1971.)

Materials: Otto, James H., and Towle, Albert, **Modern Biology,** New York, Holt, Rinehart & Winston, Inc., 1963.

Otto, James H., **et al, Biology Investigations,** New York, Holt, Rinehart & Winston, Inc., 1963.

Purpose: To build a basic structure of biological principle on which to build further concepts and facts.

Course: With the many discoveries in Biology in recent years, it is not possible in a single biology course to do anything but the basic principles in biology. Therefore, emphasis is on these basic principles on which students may build further information. Suggested themes for this level and phase are: the Nature of Life; the Continuity of Life; Microbiology; Multicellular Plants.

Level 5 Phase 3

Geology — (These texts are available from the N. S. Department of Education.)

Materials: See level 5 phase 2

Purpose: See level 5 phase 2

Course: The text used for this course is the same as that used in level 5 phase 2. The approach and the topics covered are different. Suggested topics are: the Forces That Structure the Earth's Surface; the Record of Earth History; the Earth in the Universe; the Earth and its Motions; the Materials of the Earth's Surface; the Forces That Shape the Earth's Surface. These topics are to be studied in more depth and sophistication than is possible in treating the topics recommended for phase 2.

Level 5 Phase 4

Chemistry — CHEM Study (Materials are provided by the N.S. Department of Education, if a teacher who has taken a summer school in the course is available to teach the course.)

Materials: See level 4 phase 5

Purpose: See level 4 phase 5

Course: See level 4 phase 5

Level 5 Phase 4

Physics — (These texts are available from the N. S. Department of Education.)

Materials: Dull, Charles E., **et al, Modern Physics,** New York, Holt, Rinehart & Winston, Inc., 1963.

Laboratory Experiments in Physics

Purpose: To present physics with a directness and a simplicity that will enable every student to achieve maximum comprehension.

Course: For a physics course at this level the following concepts are suggested: the Nature of Matter and Energy; Review of Measurement; Force; Motion; Work, Power, Energy, Machines; the Kinetic Theory of Matter; Wave Motion; Sound Waves; Musical Sounds.

Level 5 Phase 4

Biology — BSCS Biology Green Version — (Materials are available from the N. S. Department of Education, if a teacher who has taken a summer course in it is available to teach the course.)

Materials: **BSCS Green Version High School Biology,** Chicago, Rand McNally & Co., 1966.

BSCS Green Version Laboratory & Field Investigation

Purpose: To introduce the students to the living world, to give them some appreciation of the point of view and techniques of inquiry of the biologist, and to provide them with such biological information as may be necessary and useful in explaining the world around them.

Course: This course is based on the assumption that students will receive no other formal exposure to biology as a science. The basic emphasis is on the way in which the biological community functions. The themes to be developed are: the Living World; The Biosphere; Diversity of the Biosphere; Patterns in Biology; Within the Individual Organism; Adaptation; Man and the Biosphere.

Level 5 Phase 4

Geology

Materials: See level 5 phase 2

Purpose: See level 5 phase 2

Course: In this phase the following topics could also be included: the Record of Earth History; the Earth's Envelope of Water; the Earth's Atmosphere. It is recommended that these topics be studied very concretely in a laboratory atmosphere.

Level 5 Phase 5

Chemistry — CHEM Study

Materials: See level 6 phase 4

Purpose: See level 6 phase 4

Course: See level 6 phase 4

Level 5 Phase 5

Physics — PSSC Physics

Materials: See level 4 phase 5

Purpose: See level 4 phase 5

Course: For an overview of the course see level 4 phase 5. The basic themes suggested for this level are: Optics and Waves; Electricity and Magnetism. These themes should be studied in considerable depth and sophistication in a problem-oriented laboratory situation.

Level 5 Phase 5

Biology — BSCS Lab Blocks — (These materials are available from the N. S. Department of Education.)

Materials: Complementarity of Structures and Function, A. Glenn Richards.

Animal Growth and Development, Florence Mogg.

Plant Growth and Development, Addison E. Lee.

Microbes: Their Growth, Nutrition and Interaction, Alfred S. Sussman.

Life in Soil, David Pramer.
Animal Behavior, Harper Follanshee.

Purpose: To provide for an investigation in depth of basic concepts in biology.

Course: This course is a laboratory-oriented course in which students study six main topics in depth. The stress is, therefore, on the investigative processes of the biological scientist. The topics to be covered are listed above under materials.

Level 5 Phase 5

Geology

Materials: See level 6 phase 3

Purpose: See level 6 phase 3

Course: This course approaches biology from the historical point of view. Topics suggested are: Principles of Historical Geology; Earliest Stages of the Earth; the Precambrian Era; the Palaeozoic Systems in Canada; the Mesozoic Era; Mesozoic Systems in Canada; the Cenozoic Era — Tertiary Period; the Cenozoic Era — Quaternary Period.

Level 6 Phase 2

Physical Science — (Texts are available from the N. S. Department of Education.)

Materials: Brooks, William O., et al, **Modern Physical Science,** New York, Holt, Rinehart & Winston, Inc., 1966.

Exercises and Investigations for Modern Physical Science

Purpose: To develop a broad understanding of the physical world through an integrated senior high science program.

Course: This course was especially prepared for slower students. Concepts are fully developed by using a nonmathematical approach. Chemistry and physics are introduced so students will be able to understand the application of science in modern day. Topics suggested at this level are: Matter; Measurement; Basic Chemistry; Water; Force; Machines; Sound; Light; Electricity.

Level 6 Phase 3

Chemistry — (Texts are available from the N. S. Department of Education.)

Materials: See level 5 phase 3

Purpose: See level 5 phase 3

Course: This course is a logical follow-up of the one suggested in level 5 phase 3. At this level the course could contain the topics suggested below: Review of the Periodic Law; the Gas Laws; Carbon and its Oxides; Hydrocarbons; Chemical Kinetics; Chemical Equilibrium; Oxidation-Reduction Reactions; Nitrogen and its Compounds; Sulfur and its Compounds; the Halogen Family; Radioactivity; Metals of Group I & II; Transition Metals; Aluminum and the Metalloids.

Level 6 Phase 3

Biology

Materials: See level 5 phase 3

Purpose: See level 5 phase 3

Course: This is the second half of the **Modern Biology** course. Suggested topics at this level and phase are: Biology of the Invertebrates; Biology of Man; Ecological Relationships.

Level 6 Phase 3

Geology — (Texts are available from the N. S. Department of Education.)

Materials: Moore, E. S., **Elementary Geology for Canada,** Toronto, J. M. Dent & Sons (Canada) Ltd., 1965.

Purpose: To study the geological processes in such a way that the student will be able to recognize geological features around him.

Course: At this level and phase students continue to learn geology from the physical point of view. Topics such as the following could be used: the Work of Running Water; Ground Water; Lakes; Oceans; the Work of Ice and Snow; Igneous Phenomena; Structure and Metamorphism; Earthquakes; the Origin and Decay of Mountains; Economic Geology.

Level 6 Phase 4

Chemistry — CHEM Study

Materials: See level 5 phase 4

Purpose: See level 5 phase 4

Course: The major concepts suggested in level 4 phase 5 are studied in greater depth and applicability. Student preference may lead to a narrowing of the number of concepts studied to permit more sophisticated laboratory work and library research.

Level 6 Phase 4

Physics

Materials: See level 5 phase 4

Purpose: See level 5 phase 4

Course: For a physics course at this level the following topics are suggested: Atomic Structure; Radioactivity and Nuclear Energy; Thermal Expansion; Change of State; Illumination; Reflection; Refraction; Color; Electrostatics; Direct Current Circuits; Heating and Chemical Effects; Magnetic Effects; Electromagnetic Induction; Alternating Current Circuits; Resonance.

Level 6 Phase 4

Biology

Materials: See level 5 phase 5

Purpose: See level 5 phase 5

Course: See level 5 phase 5

Level 6 Phase 4

Geology

Materials: See level 5 phase 5

Purpose: See level 5 phase 5

Course: See level 5 phase 5

Level 6 Phase 5

Chemistry; Physics; Biology; Geology

The students in this level and phase have already completed two courses in two different sciences. At this phase it is suggested that students be encouraged to choose one of these sciences and under teacher direction apply the scientific principles learned to an original research project of the student's choice.

Physical Facilities

Science teaching should be carried out mainly in a laboratory situation. In a high school containing 740 students at least eight laboratory classrooms would be required—two for chemistry, two for physics, two for biology, and two for earth science. General science would be allocated among these laboratories.

The laboratory classrooms should be at ground level. The biology classrooms should be facing south to receive sunlight. The floors should be soft, warm, chemical resistant, and washable. Walls should be stain resistant, colorful, washable, and insulated. Chalkboards should be movable and each room should have a projection screen which may be pulled down when required. Artificial lighting should be such that it will permit variations in intensity. Each room should have ample bulletin board space, and a display case is useful. Desks should be a suitable height for study and laboratory work, should be chemical resistant, and completely and easily cleaned. Each desk should have ample storage room in the form of shelves. It is desirable for each student to have his own locker but because of space this may not be possible.

Each classroom should be equipped with a complete demonstration table which includes water, gas and compressed air outlets, A. C. and D. C. hookups, a sink and ample storage space. Audio-visual equipment such as overhead, movie, and slide projectors should be available in each room. It is desirable to have in each lab a corner where reference materials are kept. This could be used as a small "reading" area.

The biology and geology rooms should have access to the outside through sliding glass partitions. This will allow for greater experimentation. There should be adequate space for aquariums, plants, a portable greenhouse, portable gas hood, and cages for animals which might be studied in class. Each desk should have an electrical outlet for the use of a microscope. Several benches at the back of the room should be fully equipped with air, water and gas facilities. For biology, it is important to be able to control the room temperature.

The chemistry and physics rooms are much the same with more emphasis on electrical hookups in the physics lab. Each desk should have water, gas and compressed air outlets, A. C. and D. C. electrical outlets, and stone sinks with lead drains and taps. In chemistry labs stone table tops, though more expensive, are preferable. Each lab should have a master switch for the electricity to guard against overloading. A chemistry lab should have a gas hood for at least every ten students.

Each lab should have its own storage room which is adjacent to the lab. This room could be divided into two smaller rooms—one to be used for equipment and one for chemicals. This is especially important for chemistry since many chemicals will corrode much of the appartus. A special locked section should be used for any particularly valuable or dangerous chemicals.

On the following page is a diagram of an overall view of the ideal science area of a school; this proposed diagram may be used for chemistry, physics, biology, or geology.

Evaluation

> Teachers have always tried to measure the results of their teaching efforts as indicated by the progress of their pupils toward desired educational goals. Many are equally concerned about the need to diagnose and remedy revealed defects in instruction.[9]

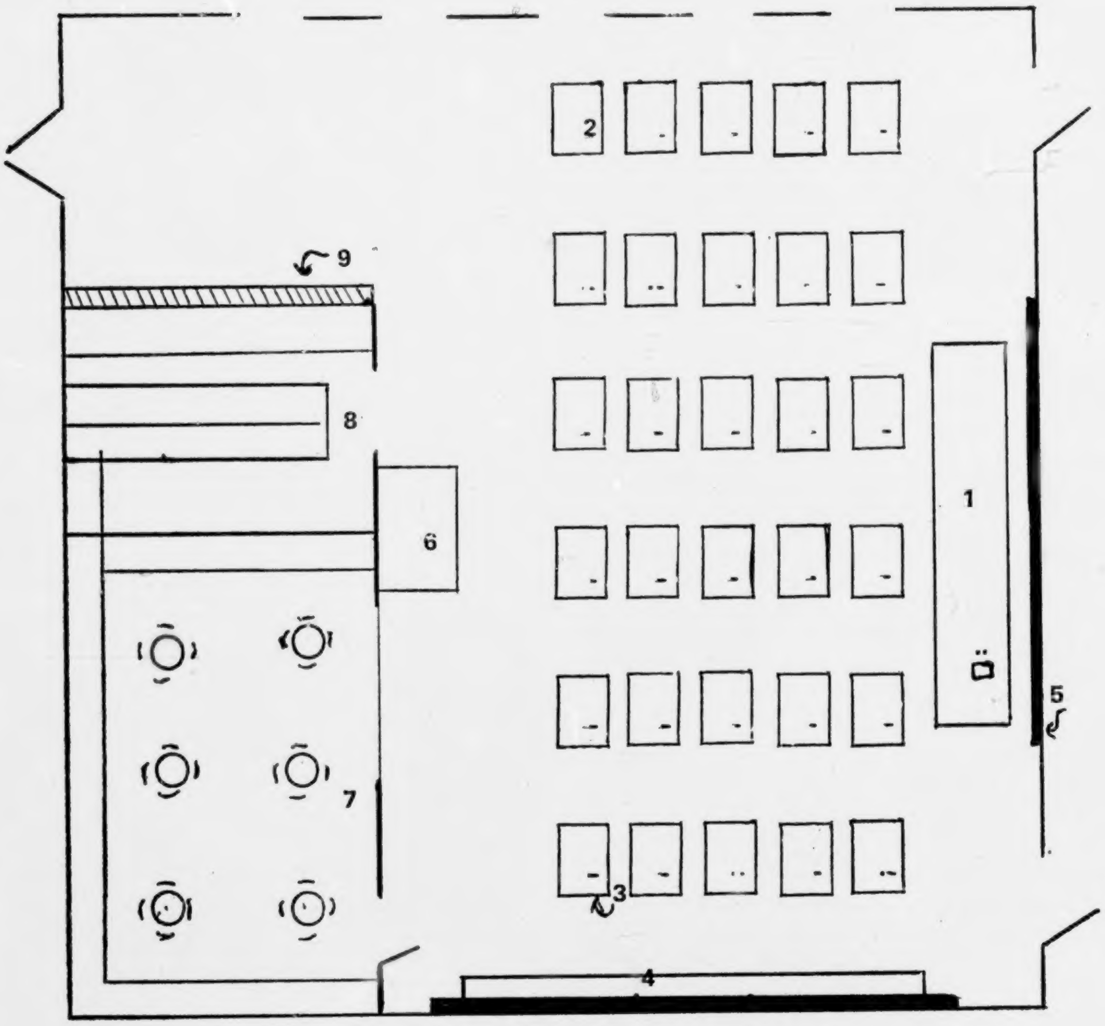
In science, as in any other subject, an effective procedure of evaluating pupil progress must be developed. The following program of evaluation is suggested for this senior high science program.

Since each proposed course could be easily divided into five major units, there could be five evaluation sessions. The form evaluation may take should be determined by the nature of the work suggested for the unit. Formal examinations are not recommended. To illustrate sound procedure in science evaluation, an evaluation method for one unit will be described. This method may be applied to any science subject and unit with minor changes.

At the beginning of the unit each student should be given an outline of exactly what is expected of him in this unit of work. This outline will give the amount of work which must be mastered by a student in order to complete successfully the work of this unit. In connection with every unit, the student must choose and complete a project from a list given for that unit by the teacher. The projects will be related to work in the unit, and each will require the student to follow some specific method of scientific inquiry. The projects will range in difficulty from simple research of reference books, to bulletin board displays, class demonstrations, or even proposing and performing an experiment. No two students may do the same project. Each student will be permitted to choose the project he wishes. The final evaluation of his work will depend on how effectively the purposes of the project have been realized. A student in a general or remedial class will of course be able to receive a mark

DIAGRAM I

THE IDEAL SCIENCE CLASSROOM



Legend

1. Demonstration Table
2. Student Tables
3. Water, Gas and Electrical Hookups
4. Project Section
5. Film Screen and Blackboard
6. Audio-visual Supplies
7. Reference Area
8. Storage
9. Bulletin Boards and Display Cases

as high as that of someone in an academic class because he is being examined at his level and on projects he is capable of doing. When the unit has been completed, the student may write a test which includes both objective and essay questions that will require him to use what he has learned in different situations. The teacher will also assess him on the basis on his performance on written, laboratory and project work. Successful completion of the work prescribed for each unit is required before the student may go on to the next unit. Should the student not receive a pass, the unit will be reviewed with him. When his difficulties have been discovered and he has studied enough to overcome these difficulties, a further evaluation of his progress will be made.

The present marking system in Nova Scotia is a numerical one. Ways must be sought to overcome the deficiencies of this marking system. A marking system, such as that used at John Dewey High School in Coney Island, New York, might be suggested as an improvement over our current one. Students receive M, MC or R for their work. M is mastery of the particular unit. This means that the student may go on to the next. MC is mastery on condition. This means that the student may go on to the next unit, provided that he does extra work in the areas in which he was deficient in the previous unit. R is retention, which means the student must repeat the unit or one equivalent to it. Such a letter system provides a more meaningful indication of actual pupil progress and encourages academic achievement.

Chapter X

ADAPTING THE SOCIAL STUDIES TO MEET THE DEMANDS OF A NONGRADED SECONDARY SCHOOL

Rationale

Social studies has a unique contribution to make to the general education of the child. It is the subject that focuses directly on developing an understanding of man in society. A person should be better able to cope with society if he has had the opportunity to study the structure and function of its social institutions, social processes, and social problems. He should have a better understanding of social behavior. He should be better equipped to make intelligent social decisions. But is this so? The fact of the matter is that as a result of the poor way in which social studies was presented and taught in the past, it failed miserably in developing the kinds of social understandings and skills it was designed to develop. Teachers were so bent on having students memorize vast quantities of facts that they lost sight of the central purpose of the social studies. Too often the chief outcome of their courses was distaste for any further exposure to the social studies in any form. While there were some brilliant exceptions to this situation, they were unfortunately all too few.

A review of the secondary social studies curricular offerings across Canada and the United States reveals that social studies instruction primarily has been offered in the form of history courses. Observation of the sad results of years of history instruction led some prominent educators recently to make the assertion that history should be dropped from the social studies curriculum and replaced by other social science disciplines that would be more suitable vehicles for achieving the objectives of social studies instruction. While this assertion was not popular, it made its point. History teachers got the message. Either they revitalize the teaching of history or they drop it. Many have taken up the challenge, and recently much has been accomplished in the area of putting their house in order. It must be realized, however, that there is nothing sacred about retaining history as the sole or chief form in which social studies instruction is offered. The objectives of social studies instruction can be achieved just as effectively through the study of other social science disciplines, either separately or in an integrated form.

TABLE ONE

Social Studies Courses Prescribed for the Secondary Schools by the Provincial Department of Education, Nova Scotia

Junior High

Adjusted Program		Academic Program
Exploring a Changing World — A three-year program:		
Grade 7		**Grade 7**
Unit I	The Earth	History: Canada to 1800
Unit II	Anglo-American	Geography: Canada and Her Neighbors
Unit III	Latin America	Civics: The Pupil as a Citizen in the Community
Grade 8		**Grade 8**
Unit IV	Western Europe	History: Canada from 1800
Unit V	The USSR	Geography: Southern Lands
Unit VI	North Africa and the Middle East	Civics: The Structure of Government
Grade 9		**Grade 9**
Unit VII	South Africa	History: Britain
Unit VIII	The Far East	Geography: Europe
Unit IX	The Pacific World	Civics: The Operation of Government

The Need for Expanding the Current Program

Table One, page outlines the social studies program prescribed for secondary schools in the province of Nova Scotia. History is the only social science discipline which is offered in every grade, and, in addition to this, it is compulsory at all levels. The discipline which is second in emphasis is geography. It is compulsory in grades seven, eight, and nine, and optional in grade ten. In grade eleven economics is offered as an elective, and modern world problems is offered on the same basis in grade twelve.

An examination of this program reveals that the behavioral sciences are totally omitted from our curriculum. This is an unfortunate situation. Since they grapple directly with the study of human behavior, the objectives of social studies instruction might be best achieved by some students through the study of these subjects. While more than one social studies is offered each year, for the most part, the nature of the courses is such that they are designed to be treated as separate disciplines.

The social studies program for the province of Nova Scotia could be vastly improved by a broader and more flexible offering. Any one of the social sciences not currently offered; namely economics, political science, sociology, anthropology, and social psychology could be considered to be an effective vehicle for social studies instruction. Not only should more of these disciplines be offered, but they should also be offered on an equal basis. What is the logic behind making history and geography compulsory and relegating the other social studies offerings to the category of electives? Implicit in this practice is the idea that some of the social studies are less worthy than others. Every high school student should have the opportunity to explore the whole gamut of the social sciences before leaving school. A scarce glance at the number of social science disciplines reveals that offering separate courses in each in the time available in the secondary school program is out of the question. A plausible alternative is to offer a capstone interdisciplinary course made up of a number of social problems which by nature involve a study of the various social sciences.

Since the current program does not make specific provision for the inclusion of all the social science disciplines, it might be suggested that teachers make a conscious effort to treat them within the framework of the prescribed course offerings. Many aspects of history could be developed in such a way that they would allow for a fairly extended treatment of sociology, political science, economics, anthropology, or social phychology. The same can be said for geography. The modern world problems course could be organized in such a way that it would become an interdisciplinary course which is truly representative of the social sciences. More specific recommendations on this matter will be given in the last section of this chapter.

What Has To Be Done To Improve The Social Studies Program

The following procedures are recommended for adapting the social studies curriculum outlines for the secondary schools in the province of Nova Scotia to make it suitable for utilization in a nongraded high school.

Curriculum development should begin with the preparation of an overview of the total program. This overview should open with a statement of the philosophy underlying the program. The course offerings should be designated, and reference should be made to how these will be organized into a program to meet the needs of a diverse student body. The approach to defining the fundamentals of the various courses should be outlined. The fundamentals of content in the various subjects should be defined in terms of themes, generalizations or concepts to be developed. The broad, generally accepted social values that are to run through the various courses should be delineated. The skills to be developed should be identified, and a strategy for weaving them through the total program in increasing complexity and in relation to more difficult material should be determined.

The following outline of the basic social studies skills should prove very helpful to social studies teachers in developing curriculum:

1. Skills centering on **ways and means of handling social materials**

    A. Skills of locating and gathering information from a variety of sources, such as:
    using books and libraries effectively, taking notes, using the mechanics of footnoting and compiling bibliographies
    listening reflectively to oral presentations
    interviewing appropriate resource persons and observing and describing contemporary occurrences in school and community
    B. Skills of interpreting graphic materials, such as:
    using and interpreting maps, globes, atlases
    using and interpreting charts, graphs, cartoons, numerical data, and converting "raw data" into these graphic forms

    C. Skills needed to develop a sense of time and chronology, such as:
    developing a time vocabulary and understanding time systems tracing sequences of events
    perceiving time relationships, between periods or eras and between contemporaneous developments in various countries or parts of the world

    D.. Skills of presenting social studies materials, such as:

organizing material around an outline
writing a defensible paper and presenting an effective speech
participating in a discussion involving social problems

2. Skills of **reflective thinking as applied to social studies problems**
A. Skills of comprehension, such as:
identifying the central issues in a problem or argument
arriving at warranted conclusions and drawing valid inferences providing specific illustrations of social studies generalizations dealing with increasingly more difficult and advanced materials

B. Skills of **analysis and evaluation** of social studies materials, such as:
applying given criteria, such as distinguishing between primary and secondary sources, in judging social studies materials
recognizing underlying and unstated assumptions or premises, attitudes, outlooks, motives, points of view, or bias
distinguishing facts from hypotheses, judgments, or opinions, and checking the consistency of hypotheses with given information and assumptions
distinguishing a conclusion from the evidence which supports it, separating relevant from irrelevant, essential from incidental information used to form a conclusion, judgment, or thesis
recognizing the techniques used in persuasive materials such as advertising, propaganda
assessing the adequacy of data used to support a given conclusion, weighing values and judgments involved in alternative courses of action, and in choosing alternative course of action

C. Skills of synthesis and application of social studies materials, such as:
formulating valid hypotheses and generalizations, and marshalling main points, arguments, central issues
comparing and contrasting points of view, theories, generalizations, and facts
distinguishing cause-and-effect relationships from other types of relationships, such as means and ends

combining elements, drawing inferences and conclusions, and comparing with previous conclusions and inferences
identifying possible courses of action
making tentative judgments as a basis for action, subject to revision as new information or evidence becomes available
supplying and relating knowledge from the social studies as background for understanding contemporary affairs

3. Skills of **effective group participation**

A. Assuming different roles in the group, such as gadfly or summarizer, as these roles are needed for the group to progress
B. Using parliamentary procedures effectively
C. Helping resolve differences within the group
D. Suggesting and using means of evaluating group progress

Certainly a major purpose of social studies instruction is to place emphasis on the development of those abilities which encourage the accurate and intelligent utilization of social science data and which make habitual the orderly processes of mind necessary to carrying on reflective thought and to taking action based on such thinking.[1]

The kind of organization of the social studies program which is recommended by the provincial Department of Education is not adequate for meeting the needs of a diverse student body. A proposed reorganization of this program for the province of Nova Scotia to suit the needs of a nongraded junior-senior high school containing at least eight hundred students is presented in Table II, page , According to this scheme of organization, the program is divided into five phases and six levels. The system of phasing is adapted from the one developed in Melbourne High School, Florida by Dr. B. Frank Brown. It is our belief that a five-phased program is needed to accommodate the diverse student body found in a typical secondary school today. In order to clarify this system of phasing, it will be equated with the current organization of the secondary school program in this province.

TABLE II

PROPOSED REORGANIZATION OF THE NOVA SCOTIA SECONDARY SOCIAL STUDIES PROGRAM

	Phase 1	Phase II	Phase III	Phase IV	Phase V
Level 7	Exploring a Changing World	History: Canada Geography: Canada and United States Civics: The Pupil as a Citizen in the Community	History: Canada Geography: Canada and United States Civics: The Pupil as a Citizen in the Community	History: Canada Geography: Canada and United States Civics: The Pupil as a Citizen in the Community	———— – – – – – – –
Level 8	Exploring a Changing World	History: Canada Geography: Southern Lands Civics: The Structure of Government	History: Canada Geography: Southern Lands Civics: The Structure of Government	History: Canada Geography: Southern Lands Civics: The Structure of Government	————
Level 9	Exploring a Changing	History: Britain Geography: Europe Civics: The Operation of Government	History: Britain Geography: Europe Civics: The Operation of Government	History: Britain Geography: Europe Civics: The Operation of Government	————
Level 10	Ancient and Medieval History Modern World Geography	Ancient and Medieval History Modern World Geography	Ancient and Medieval History Modern World Geography	Ancient and Medieval History Modern World Geography	Individually Prescribed Individually Prescribed
Level 11	Modern History Fundamentals of Economics	Modern History Fundamentals of Economics	Modern History Fundamentals of Economics	Modern History Fundamentals of Economics	Individually Prescribed ————
Level 12	Canadian History Modern World Problems	Canadian History Modern World Problems	North American History Modern World Problems	North American History Modern World Problems	Individually Prescribed Individually Prescribed

Phase One Courses are for the kind of student who is currently accommodated in the adjusted program. These are the students who have limited academic capacity and who are so deficient in the basic learning skills that they need special help in small classes. Phase Two Courses are for students who would be considered to be remedial cases in the junior high schools where remedial work is offered or in the general course in senior high. They have average or better ability but are deficient in the basic learning skills. Phase Three Courses are roughly equivalent to what is now offered in the academic program. They are designed for students of average ability and achievement. Phase Four has no equivalent in the program of the provincial Department of Education because our province has made no special provision for a program to accommodate superior students. Students who according to our proposal would be in Phase Three and Phase Four have been lumped together in the one academic program. Unless the teacher made special provision for accommodating the talents of the superior students, they went unchallenged. Phase Five Courses also have no equivalent in the Departmental program. They are designed for the gifted students who have unusual aptitude for and interest in social studies and who are mature enough to be sufficiently highly motivated to be capable of a high degree of self direction in the pursuit of their studies. This phase is not suggested for the junior high school because students at that level are not considered to have the background and the maturity needed for independent study.

This system of phasing differs from the diversified program offering we now have under the comprehensive school system in that it allows a student to be placed by subject. Under the Departmental system a student is placed in a particular program. This is not realistic because of the way in which student achievement varies from subject to subject. Placement by program also leads to the labeling of students in unfortunate ways. Students in the adjusted program, for example, are commonly looked upon as being stupid or dull.

Students are to be accomodated vertically according to levels. The levels are equivalent to the years students spend in junior-senior high school. Demarcating courses by levels rather than grades is not a matter of mere semantics. The term grade has so many unfortunate connotations that militate against flexibility that it has to be dropped. Implicit in the connotation of a grade is the idea of repetition, and this we aim to avoid through the appropriate placement of pupils in courses that are realistic for them. In order to fulfill the requirements of the Department of Education, the courses allocated to each level are equivalent to those outlined in the Program of Studies and the Curriculum Guides. It is our contention that these courses can be both adapted to the needs of the students and modified to include greater emphasis on the newer social sciences. This does not mean that we believe that these are the only courses that should be offered. They are requirements, and we are simply attempting to make the most of them.

This raises the question: What has to be done to develop curriculum more adequately at the level of a particular course? In the past our statements of objectives have been too broad, pious, and all-inclusive to provide meaningful direction for our educational activities. What teachers have to do is to define course objectives in meaningful behavioral terms that lend themselves to translation into more specific behavioral objectives at the levels of unit and lesson planning. These objectives should be consistent with the broad philosophy of the total program.

When it comes to selecting and organizing course content, the biggest mistake that teachers made in the past was to outline the content topic by topic in the order in which they were to be developed without any reference to the themes, generalizations, or concepts which were to be developed through these topics. Once the fundamental ideas to be developed have been identified, then it is easy to pick a range of topics and a sampling of facts which will be suitable for the development of these ideas.

Systematic skill development has been greatly neglected in the social studies. Students have to be taught how to read each discipline, how to critically examine and apply social knowledge, and how to use the tools peculiar to each discipline. The basic skills required for mastering the social studies should be defined according to a hierarchical order of difficulty, and the sequential development of each component should be defined. Then the teacher should assess the achievement of his students to determine the level of complexity of the treatment of these skills.

Defining the fundamentals of a course in terms of themes, concepts, and generalizations enables the teacher to adapt this course flexibly to meet the needs of a variety of students. Since no one sampling of content is sacred to the development of a particular theme or concept, content can be chosen according to the interest, ability, and achievement of the students. For example, the sampling of content chosen to develop the basic themes of the Canadian History Course offered at Level Seven could vary greatly from Phase Two to Phase Four.

One of the weakest aspects of social studies instruction has been methodology. Too much passivity has been generated by overuse of the lecture method. Little more than lip service has been paid to the basic principle that it is what the student does that is learned, not what the teacher does. A course really takes shape in the hands of a teacher. It is his responsibility to devise the kinds of learning experiences that will make it meaningful to his students. Today there is a great deal of emphasis on developing the technique of inquiry of a particular discipline. This calls for developing skill in handling the tools of a particular discipline and in interpreting data gained therefrom. In history students should learn how to use primary courses in such forms as artifacts, newspaper reports, letters, and legal documents. In geography he should develop skill in using the tools of the geographer—maps, graphs, charts, statistics, and aerial and surface photographs. The same applies to all the other social science disciplines.

Fuller utilization of discussion, role playing, simulation, and gaming would lead to the achievement of a wider range of objectives. Special attention should be paid to refining the art of questioning, for it is the basis of inductive teaching. Problem-solving and case-study approaches lend themselves particularly to the development of critical capacities. Choice of method or approach should be made in terms of the objective of the lesson to be taught and the type of students to whom it will be taught.

The Adaptation of Courses By Phases and Levels

An attempt will now be made to describe how the social studies courses offered at each level can be adapted to meet the needs of students in the different phases and at the same time fulfill the course requirements of the Department of Education.

Level Seven

Exploring a Changing World

Exploring a Changing World is an integrated social studies course designed to be offered to students in Phase One over a three year period. The course outline developed by the Curriculum Division of the Nova Scotia Department of Education follows very closely the outline for the prescribed text, **Exploring a Changing World,** which is a regional geography of the world. In order to make this an interdisciplinary course, a teacher would have to define those aspects of the course which draw insights from history and the other social sciences.

Since this course really involves a longitudinal study of world regions, we would suggest that one set of objectives be devised for the program in Levels Seven, Eight, and Nine and that basic themes be defined that would run through the whole program. Particular emphasis should be paid to skill development, since students in this phase have a marked tendency to be deficient in the basic skills required for learning the different disciplines. The development of vocabulary, basic comprehensive skills, and the fundamentals of using the tools of the geographer and the historian should be handled in very simple forms. It is suggested that no memorization of content be required at this level so that the time can be devoted to basic skill development and an examination of the practical implications of the matters under study.

Some basic themes will now be suggested for the units of this course along with some ideas for their development. The basic units outlined by the Department for the first year of this program are the following: 1) The Earth, 2) Anglo-America, and 3) Latin America.

An appropriate theme for Unit One, The Earth might be Canada's place in the world community. Since a student's background of experience has a great deal to do with what he learns, it is recommended that this course begin with a thorough study of the home community. The home community provides the yardstick or criteria in terms of which the student interprets every other place. Special emphasis should be put on those aspects of the home community that were neglected in earlier studies and on using it as a concrete basic for developing basic skill in handling the tools of the geographer and the historian. Multi-purpose field trips can be conducted during which students examine geographic phenomena such as river-valleys, plains, hilly uplands, harbours, secondary and primary industries, and the structure and function of a town or city. Students can be introduced to the world of maps by mapping the school grounds. They can make simple circle graphs of land use in the area. To get a feel for local history students can examine primary sources in such forms as local artifacts, pictures, letters, and legal documents. Integrated into this should be a study of the pupils place in the local community. Sociological or psychological concepts could be drawn upon to help the students examine their relationships to their homes, their school, their churches, their peers, and local authorities. The next logical step might be to have them examine the place of their community in Canada, and then go on to a study of Canada's place in the modern world.

The theme of the second unit might be the role Britain played in the development of Canada. This could be examined from a political, economic, historical, cultural, and geographic point of view. The aspects of this study should be carefully defined and delimited so that they can be related meaningfully to the current situation in Canada. The political aspects of this unit could serve as a base for a study of the structure and function of government at different levels. This in turn could provide a proper perspective for the study of civic or citizenship responsibilities.

The theme of the third unit might be Canada and Latin America: lands of contrasts and similarities. This obviously would involve a comparative study of the two areas on a selective basis. A geographic study of the comparative location, size, climate, population, resources, industrial development, and way of life of the two areas would be most appropriate. Selected countries which were former British colonies could be studied from the point of view of comparing their march toward nationhood with that of Canada.

The development of three units per year is suggested in the Departmental Course Outline, but the number and the extent of each should be determined by the teacher. A whole year might very profitably be spent on Unit One, depending upon how the teacher wanted to develop it and how proficient the students were in mastering what was prescribed for them. The approach suggested for Unit One would give the students the kind of background needed to perform in Phase Two, if the teacher should regard a transfer to be desirable.

Canadian History

The Curriculum Guide for the Province suggests that Canadian history courses be offered in both grades seven and eight, and hence we would suggest that these courses be combined into one unified whole to be considered in both Level Seven and Level Eight. One prescription of objectives and basic themes would provide for greater unity and sequency. The following is a sampling of objectives for this course which could provide meaningful direction for the selection of themes that are crucial for an understanding of Canadian history and the content and skills needed to develop them.

1. To develop an understanding of the major forces which account for the development of the nationalistic problems Canada has today.

2. To develop an understanding of how the forces of geography helped to shape Canada's development as a nation.

3. To develop an appreciation of the values and traditions which are part of the Canadian way of life.

4. To develop tolerance of and respect for the different nationalities represented in our population.

5. To develop the ability to locate, gather, comprehend, organize, interpret, and apply historical information.

6. To develop the ability to examine critically major issues in Canadian history.

These objectives would be achieved to different degrees and in different ways, depending upon the group of students.

In the Provincial Course Outline, a large number of topics are suggested for coverage in grades seven and eight. A more systematic approach to content selection is needed. The themes should be defined first, and then the selection of topics and sub-topics for their development.

The following is a brief sampling of themes which focus on major developments in Canadian history:

1. The role that foreign powers played in the development of Canada.

2. Canada's economic development — a struggle against distance, the elements, and foreign domination.

3. The forces that account for the development of Canada's nationalistic problems today.

4. Canada's submergence of its natives — the Indians and the Eskimos.

Themes such as the above could be developed in all phases and should run through both Levels Seven and Eight. The difference among the courses offered in the various phases would lie in the complexity and depth in which the themes would be developed, the sampling of content chosen as a vehicle for their development, and the approach which would be utilized.

In all Level Seven Courses there should be a great deal of emphasis on the basic skills required for learning history. At the higher phases these skill hould be treated in greater complexity and in relation to more difficult materials. Students should become acquainted with using primary source materials such as artifacts, explorers' maps, letters, and legal documents. Students in the higher phases should be introduced to simple methods of interpreting these sources. Some students will be ready to learn how to do some basic research in the library.

It has been stated that history is important not for its own sake but for our sakes. Taking a cue from this statement, every effort should be made to relate history to important matters that it helps to explain today. For this reason, we suggest that civics be treated as an integral part of the history course. Civics, after all, is primarily applied political science, and a major part of recorded history is political history.

Geography of Canada and Her Neighbors

According to the Departmental Guide, geography courses are to run consecutively from grades seven through ten. The basic concepts, values and skills should be defined in advance and should run spirally through the whole program. The basic concepts around which each course might be built are the following: location; site; man-land relations; resources, culturally defined; globalism; and the ever-changing face of the earth. Basic values such as the dignity and worth of the individual and human equality should be central in determining the approach to treating human issues. The basic skills involved in reading and interpreting primary and secondary geographic resources should be stressed, and students should receive a great deal of practice in the variety of skills involved in handling the tools of the geographer — various kinds of flat maps, globes, aerial and surface photographs, charts, diagrams, and statistics. The objectives stated for each course should reflect a balance of concept, value, and skill development.

The following chart outlines the matters that should be studied in relation to a particular political division in order to develop the suggested concepts.

Location — nominal, mathematical, and relative

Physical resources and climate

Institutions — the structure and function of the

1. Home
2. Church
3. School
4. Government
5. Business

Culture and way of life

Relations with other countries

Since Canada and Her Neighbors is recommended as the compulsory geography course for grade seven by the Department, it will be adapted to the needs of pupils in Level Seven from Phase Two to Phase Four. The Departmental Guide contains many worthwhile suggestions for approaching this geography course. It recommends that this course begin with a study of the home region. This is a very sound procedure, for, as we mentioned earlier, the home region is the yardstick or criteria a child uses in interpreting all other regions. In addition, the basic tools of the geographer can be introduced easily in appropriate concrete forms in relation to the home region.

The Departmental Guide defines Canadian regions according to political divisions. Its suggestion that the study of Canada begin with an overview of the country as a whole to be followed by a study of regions defined according to provinces is sound. In the light of the demands of this course, the allocation of approximately one-fifth of the time for geography to the study of the United States is realistic.

The chart presented above provides an effective model for determining what to stress in each region. The increased emphasis on human geography suggested by this model would enable the teacher to bring in concepts from economics, sociology, social psychology, and anthropology to put greater emphasis on human behavior. The sophistication of the skill work will depend on the background and achievement of the students. In order to make the study of specific institutions and their effects on people more real, we would suggest that some use be made of sample studies and case studies.

Our approach to dealing with places in the past was wrong. How many students made long lists of cities, towns, counties, and seaports without developing any real conception of what each was. Places should be approached in such a way that students begin to develop a conception of what a city, a seaport, or a country is, and his understanding of the structure and function of these areas should increase through the grades.

In order to adapt this course to the needs of the students, it is suggested that with the slower students the concepts and skills be developed more simply, concretely, and slowly; with the brighter students in the higher phases they can be developed in greater depth and complexity. In order to achieve this goal, a variety of materials written at different grade levels is needed.

Level Eight

Exploring a Changing World

The course, Exploring a Changing World, which was begun in Level Seven, Phase One is to continue into Level Eight. The teacher therefore should start where he left off in Level Seven and should approach the organization and implementation of the course in the same manner as was recommended in that level. This year the pupils should be able to handle the fundamental content and skills with more sophistication.

According to the Departmental Guide, three units are suggested: 1) Western Europe, 2) The U.S.S.R., and 3) North America and the Middle East. Since it was recommended that this course be a logical extension of the previous one, a teacher may not do all these units, depending on how much he had accomplished the previous year.

In the previous section on Level Seven, it was suggested that the Canadian history courses prescribed for grades seven and eight be combined into a unified whole. Therefore, the amount of work accomplished in the previous level rather than an arbitrary demarcation line should determine where the teacher will begin at Level Eight. The approach to content and methodology and adjusting the course to the students in different phases suggested for Level Seven should carry over into Level Eight.

Geography of Southern Lands

The Departmental Guide prescribes Southern Lands as the geography course for grade eight. A study of the large number of countries in this domain is out of the question. Since the course spans three continents, it is suggested that it might be organized into three units. One unit should be devoted to each continent. Each unit might be approached in the following manner. Begin the unit with an overview of each continent and then select for intensive study two or three countries or political divisions representative of different regions within the continent. This sort of organization would lend itself to a comparative study of different countries and continents. The subject matter should be selected accroding to the model developed on page , and the same approach should be utilized as was suggested in Level Seven. This course could be adapted to the different phases by varying the depth of content development and the complexity of skill exercises and assignments.

Level Nine

Exploring a Changing World

The course, Exploring a Changing World, culminates at Level Nine. The same approach to content and methodology as was suggested for the previous levels should be utilized. While the Department recommends that the following unit be developed: 1) South Africa, 2) the Far East, and 3) the Pacific World, this may not be accomplished. The emphasis should be on mastery, not coverage.

British History

A British history course has been prescribed for grade nine. The approach to this course recommended in the Departmental Guide lends itself to adaptation to a nongraded school. The course is organized around a basic theme — the heritage which has been passed on to us. This heritage has been divided into the following main parts:

Character of the British people.
The English language and literature.
English law and British justice.

The liberty of the individual.
Parliamentary government and democracy.
Social justice.
Religious toleration.
The British Empire and the Commonwealth of Nations.[2]

The parts of the heritage thus identified provide the organizing elements for unit development. A unit could be developed around each part or sub-theme. At all times the effects events in Britain had on Canada should be stressed. A number of these themes help to explain social and political issues that are prominent today. The complexity of content and the depth of treatment would increase from Phase Two to Phase Four. Students in Phase Four might be allowed to develop one sub-theme on their own as a research project. They should define the sub-divisions of their project and the procedure for its development, under the guidance of their teacher.

More emphasis should be put on the development of critical capacities at this level. Many students should be ready to compare materials from different sources and to interpret different points of view. This approach should prove to be very challenging to the superior students. Students in Phase Three and Four should certainly be ready to learn to do some basic research at both the descriptive and interpretive levels. This course lends itself to a fascinating examination of colorful historical personalities. Concepts from psychology should be drawn up to enrich this study, and role playing could be utilized to teach students how to identify with others. Speeches, poetry, social novels, and music could be used to vitalize instruction by conveying the spirit of the times.

Geography of Europe

A study of the geography of Europe is prescribed for this particular level. We would recommend the same approach as was utilized in the case of previous geography courses. Start with an overview of the whole area. Select countries which are representative of the various regions in Europe, and build the units around a study of these countries. Select a sampling of content according to the model previously suggested, and vary it in depth and complexity from phase to phase. Utilize the techniques previously suggested.

The following is an example of a prescription of units according to this procedure:

Unit I — An Overview of Europe
Unit II — The British Isles
    a) England b) Scotland
Unit III — Northern Europe
    a) Sweden b) Finland
Unit IV — Western Europe
    a) Germany b) Switzerland
Unit V — Eastern Europe
    a) Czechoslovakia b) Yugoslavia

Since part of the geography of Europe provides an excellent background for the study of British history and the World Wars, some integration of history and geography is quite realistic. Since this is the culminating course in geography for many students in the academic program, the course might end with a project designed to integrate some of the key insights gained from geography and requiring the use of a variety of the tools of the geographer. A problems approach could be utilized in defining this project.

Level Ten

World Geography

For students who elect to study geography at Level Ten, a course in World Geography is prescribed. This course should provide for the integration of insights previously gained and the higher utilization of skill in handling the tools of the geographer through their application to appropriate situations. To accomplish this purpose, we would recommend that a series of geography problems of world-wide magnitude be defined which would focus on the major components outlined in the model containing guidelines for selecting content. To broaden the approach to handling these problems, concepts could be borrowed from economics, sociology, social phychology, and anthropology. The processes involved in the problem-solving approach should be identified, and practice exercises should be defined to develop facility in each. These processes may be outlined as follows:

1. Identifying and defining the problem.
2. Collecting, organizing, and summarizing data.
3. Drawing conclusions on the basis of evidence.
4. Preparing a final report.

The problems selected could vary from class to class, depending upon the interests of the students. Students in the higher phases would be expected to pursue the problems in greater depth than those in the lower phases. Students in Phase Five could select one major problem to be studied in depth and sophistication on an independent basis.

The following example illustrates the utilization of problem-solving procedure in relation to the specific problem of overpopulation. An attempt should be made to define categorically the concept of overpopulation. The aspects of this problem to be studied should then be delimited. The student should utilize the tools of the geographer and of the other social scientists to analyze the population problems in the major regions of the world defined for study. His conclusions regarding overpopulation should then follow logically from the evidence. In other words, he should be able to assess to what extent his concept of overpopulation applied to the sampling of regions chosen for study.

Ancient and Medieval History

Ancient and Medieval History is the compulsory social studies course which is prescribed for grade ten. Adequate coverage of the events that span this period is an impossibility; so we must search for an alternative approach to provide some order and direction for this study. Our suggested approach is to define an appropriate theme which would run through the entire course. Such a theme could be the major contributions the early civilizations made to the modern world. Then the early civilizations to be studied should be identified, and the units should be organized around the major contributions of each civilization. This approach would enable the student to see that the current problems, issues, and events have roots deep in the past. Stress should be put on having the students examine the significance of these contributions in relation to current situations they help to explain. Students would thereby be encouraged to take an analytical approach to history.

The early civilizations around which the units are to be built might be identified as follows:

1. Primitive societies.
2. Egyptian civilization.
4. Syrian civilization.
5. Cretan civilization.
6. Greek civilization.
7. Roman civilization.
8. Western civilization in the Middle Ages.

The course can be adapted to all the phases by varying the number of contributions to be considered in each unit, the depth to which they will be developed, and the approach to developing them. With students in Phases One and Two, emphasis may still be needed on the basic skills for reading and writing history. Methods of interpretation should be handled in simple forms in these phases. In Phases Three and Four, this course could be used as a vehicle for examining the nature of history and the basic skills involved in historical research. A study of early civilizations lends itself nicely to demonstrating the selective nature of history and the limitations of historical evidence. Students in Phase Five should be required to identify a problem and to develop a procedure for researching it on an independent basis. Special provision should be made for weekly consultation with a staff advisor.

While this course could be adapted for students in Phase One, they might gain more direct insight into human social behavior through a study of either basic sociology or social psychology.

Level Eleven

Modern World History

The study of Modern World History is compulsory for students in grade eleven, according to the prescription of the Department of Education. Coverage of the vast span of events of this era on a topical basis and in a chronological order is not a sound approach. There are a number of alternatives, one of which we will describe. A sound alternative would be to define a number of basic concepts which could be suitably developed through this course. A list of concepts such as the following would be appropriate: monarchy, dictatorship, Capitalism, Communism, Socialism, Nazism, Fascism, democracy, nationalism, imperialism, isolationism, materialism, liberalism, revolution, war, freedom, interdependence, and the dignity and worth of the individual. These concepts could be the organizing elements for a study of the major developments that explain the kind of world in which we live. These developments fall into the following categories: political and military, economic, social, cultural, intellectual, and religious. Around each of these categories a unit could be built to provide for a longitudinal study of the major developments which fall within that division. These developments should be treated from the point of view of how they help to explain problems, issues, and events that are important today. From time to time it would be necessary to dwell on the interrelatedness of various categories of developments. Such an approach would lend itself to the treatment of history as an interdisciplinary study. Cencepts borrowed from the behavioral sciences, economics, political science, and geography would contribute much to the study of major developments.

We would suggest that the same basic approach be taken to the organization of this course at all phases, but that the course be adapted to the needs of students in the different phases by varying the sampling of content, the depth in which it is treated, and the resource materials which are to be used. An attempt should be made to develop interpretive and critical skills to a high degree, particularly in Phases Three, Four, and Five. The study of the modern era could be vitalized and enriched through selective utilization of its literature, music, art, speeches, and movies.

Economics

The only course in the Fundamentals of Economics offered in the secondary school program is prescribed for grade eleven. This course should be organized in such a way that it provides fundamental insight into the nature of economics and develops a way of looking at economic problems. A sound approach to developing this course would involve an attempt to define the basic economic concepts around which it should be built, such as supply and demand, price, competition, economic scarcity, economic efficiency, and economic interdependence. Then a series of economic problems which is representative of the major ones that plague individuals and society should be identified. Each problem could constitute a unit of work so the basic concepts of economics and the tools and techniques of the economist could be utilized in developing each unit. Appropriate games, case studies, field trips, problem-solvng exercises, and simulation techniques could be used to enhance the reality of instruction. This course could be geared to suit the needs of students in the various phases by varying the sampling of problems to be studied and the sophistication of the techniques for handling them. In view of the fact that this is the only economics course available in the secondary school program, it should not be offered in Phase Five because students would not have had the opportunity to gain the necessary background for independent study in this area.

Level Twelve

Canadian and North American History

The Canadian History Course prescribed for the grade twelve general program lends itself to adaptation to the needs of the students in Phases One and Two, Level Twelve. The North American History Course prescribed for the grade twelve academic program lends itself to adaptation to the needs of the students in Phases Three, Four, and Five. In both these courses, Canadian history should be treated in such a way that it becomes a logical extension of the Canadian History Course developed for Levels Seven and Eight. The themes outlined for Levels Seven and Eight should be developed in greater depth and complexity. Additional themes should be defined to reflect the emphasis on constitutional history expected at this level. The structure and function of the Canadian government should be studied in depth. Students in Phases Three, Four, and Five should, in addition, study constitutional issues in Canadian and American history on a comparative basis.

An effective way to select units for this course would be to define major political and constitutional problems and issues in Canada and the United States today and to use Canadian and American history for developing an understanding of the background of these problems. The number of problems and the depth in which they would be studied would vary from phase to phase. The critical capacities and research skills of the students in Phases Three, Four and Five should be refined to the point where they can produce a paper reflecting sound research procedures.

Modern World Problems

Modern World Problems is an optional social studies course prescribed for grade twelve. The Departmental Guide outlines the topics on which background knowledge is to be developed, the problems relating to government which are to be studied, and then leaves it up to the teacher to select current domestic and international issues for study.

An alternate approach could be used to make this a much more effective course. This course could be transformed into a capstone problems course of an interdisciplinary nature designed to enable students to explore a cross-section of modern world problems and the various social science disciplines that shed light on these problems. The problems to be studied should be chosen from a cross-section of major social problems that have been of continuing concern to people throughout the world over a long period of time. Problems which might be identified to be of this nature are war, poverty, overpopulation, illiteracy, and crime, to mention a few. The course would vary from phase to phase according to the problems identified for study and the sophistication and depth in which they are treated. A course of this nature could prove to be very meaningful for students in Phase One. All the various skills involved in the problem-solving approach should be brought to bear on the problems under investigation. In addition, a variety of the tools of the various social scientists should be utilized, depending upon the nature of the problem. This course could be used to compensate for the lack of emphasis on the behavioral sciences which is apparent in the secondary social studies program for this province.

Conclusion

The procedures suggested herein are the simplest ones that can be devised to accommodate the secondary social studies program prescribed by the Department of Education to the needs of a nongraded school. The approach is sound. When greater local freedom is gained to prescribe courses for different levels, it will be possible to offer a more flexible and a better balanced social studies offering.

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III

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Anderson, Dr. Robert, **The Curriculum of the Nongraded School.** (Tape No. 2, St. F. X. Auditorium), Antigonish, N.S.: St. Francis Xavier University, September, 3rd-4th, 1969. A tape recording made during the St. Francis Xavier Institute on the Nongraded School.

——— **The Curriculum of the Nongraded School.** (continued), and **Dialogue on the Curriculum of the Nongraded High School.** (Tape No. 2, Room 138, Nicholson Hall), Antigonish, N.S.: St. Francis Xavier University, September 3rd-4th, 1969.

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